FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

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"FLIGHT" PHOTOGRAPHS.

To those desirous of obtaining copies of "Flight" Photographs, these can be supplied, enlarged or otherwise, upon application to Photo. Department, 36, Great Queen Street, W.C.2

For Sizes and Prices, see Advert. on page xxx.

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list :—

1928

Feb. 29 .... **Royal Aero Club Monthly House Dinner**
Feb. 29 .... **Yorkshire Aeroplane Club Supper Dance**
Mar. 1 .... **"Experiences with the Baghdad Air Mail." Wing-Com. R. M. Hill, before R.Ae.S. & Inst.Ae.E.**
Mar. 3 .... **Rugby, Navy v. Army, at Twickenham**
Mar. 3 .... **Aero Golfing Soc.—Team Match v. Moor Park G.C.**
Mar. 15 .... **"Testing of Materials Used in Aircraft Construction." Dr. Rudolf, before R.Ae.S. & Inst. Ae.E.**
Mar. 15 .... **Aero Golfing Soc.—Winter Meeting, Sir Samuel Instone Challenge Cup**
Mar. 24 .... **Rugby, R.A.F. v. Army, at Twickenham**
Apl. 8–9 .... **Aerial Display, Suffolk Aeroplane Club**

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The Index for Vol. xix of "Flight" (January to December, 1927) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2. Price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT

LEAVING Croydon aerodrome, London, on the morning of Tuesday, February 7, Mr. "Bert" Hinkler arrived at Port Darwin, Australia, on Wednesday, February 22, having covered the distance of 11,000 miles in 16 flying days. In view of the low power of the "Cirrus" engine (80 h.p.), the flight must rank among the very finest in the history of flying, and the Empire has cause to be proud of "Bert" Hinkler. What makes the flight all the more noteworthy is that Hinkler flew solo, with no passenger to relieve him of the controls for even short periods, and having to be his own navigator as well as his own mechanic, ground engineer and general factotum. One is compelled, in this connection, to make comparisons with Col. Charles Lindbergh's flight across the Atlantic from New York to Paris last year. Lindbergh covered, it is true, a much greater distance in one flight than Hinkler has done, but he did "get it over and done with." Hinkler, on the other hand, has had to stick it for day after day, and arriving at the aerodrome after a whole day's flying he has had to look after his engine and machine before there was any rest for himself. Only a pilot with long experience can fully realise what this must have meant, and admiration for the determination and grit of the "great little man" can be absolutely unstinted. In our issue of February 9 we wrote "If he can get to Australia in three weeks or a little under, he will have done wonders. If he should be compelled to take longer, small blame to him. As the pioneer, so to speak, of long-distance flights on a low-powered machine (London–Turin and Sydney–Bundaberg non-stop in the Avro 'Baby' many years ago) his reputation

Croydon–Australia, 16 Days

would not suffer should the fates be unkind. On the other hand, if anyone can do it Hinkler can." He has now settled all doubt by reaching Port Darwin in about two days less than he had expected, and the world in general and the British Empire in particular has cause to applaud his feat.

The machine used by Hinkler is, as most of our readers probably know, the original Avro "Avian" designed and built for the *Daily Mail* competition at Lympne. The machine was built as light as possible for competition purposes, and is nothing like as sturdy as the production type "Avians" now standardised and marketed by the Avro firm. Yet the machine appears not to have given the slightest trouble. Thus one may take it that the production type of "Avian" is even more reliable and even more suitable for the private owner.

The "Cirrus" engine with which the "Avian" is fitted has long ago established a reputation for reliability, and on this long flight it has once more proved that reputation to be thoroughly well deserved. Hinkler has sent a telegram to the makers in which he states that the engine has run perfectly throughout, and that it is in as good condition as on the day when it left the test bench. Considering that most of the "hops" have been of close upon 1,000 miles, that is praise indeed. The Fairey metal airscrew with which the "Cirrus" is fitted will have contributed a good deal towards the success, since the extra efficiency must have enabled Hinkler to run the engine at lower power and thus to "nurse" it to some extent.

Altogether this wonderful flight is one of the finest pieces of propaganda which British aviation could possibly have had, and all concerned are to be heartily congratulated.

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Testing the "Slot"

It is not our custom generally to deal with air crashes in these columns, but one which occurred early this week was of such an exceptional nature, and the circumstances being such that a quite erroneous impression might easily be created, we deem it necessary to state the facts as prominently and clearly as we are able. We refer to Captain Broad's crash at Stag Lane aerodrome on a De Havilland "Moth," fitted with Handley Page automatic wing-tip slots. For some considerable time the De Havilland company has been carrying out experiments with slots and, after a good deal of experimentation to discover the best arrangement, one has been found which was regarded as extremely effective. Capt. Broad, after testing out the slots at a safe altitude, and finding that they worked entirely satisfactorily, proceeded to a different set of tests in which it was the intention to discover the efficacy of the slots under circumstances representing as closely as possible those obtaining in the great majority of crashes on machines not fitted with slots. In carrying out the tests Broad was deliberately taking a considerable risk in order that full experience of the action of the slots under these conditions might be obtained. He repeated the manœuvre time after time so that there should be no possible doubt, and chance should play as small a part as possible. The manœuvre carried out consisted in taking off and making a steep climbing turn, cutting out the engine at quite a low height. The machine would naturally stall, but thanks to the slots it did not go into a spin and dive, but descended on a even keel. On the last occasion the machine lost height at, perhaps, a slightly more rapid rate than Broad had expected, or he cut off his engine a little lower than usual. At any rate, the machine commenced to sink, on an even keel, and was beginning to gather forward speed when unfortunately a hedge was in the way. The wheels struck the hedge, and the machine nosed down, throwing Broad out and shaking him up somewhat. His face was slightly cut, and he suffered a little from concussion. He is now, we learn, getting on very well, and will, it is hoped, soon be flying again.

The lesson of the accident is that the automatic slots, which one may perhaps, for the benefit of the non-technical reader liken to four-wheel brakes, cannot entirely prevent accidents under certain conditions. In other words, the slots can be "abused," just as can the four-wheel brakes. But there is not the slightest doubt that, had the "Moth" not been fitted with slots when the accident happened, the machine would have crashed badly, and in all probability with very serious consequences to the pilot. In other words, had the machine been without slots, and had the engine failed accidentally instead of being cut out deliberately, a serious crash would have been inevitable. All will wish the plucky pilot a speedy recovery, and in the meantime it must be some considerable consolation to him in his misfortune to know that by his experiment he has gathered information the value of which can scarcely be overrated.

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Wright Biplane at South Kensington

THE machine in which the Wright Brothers ma le their first flights arrived in the Thames from America on February 20. It is to be lodged in the Science Museum at South Kensington.

R.100 and R.101

SIR SAMUEL HOARE in Parliament, on February 9, said he hoped both ships would be ready to take the air this year—R.100 probably before the end of this summer.

Gloster "Grebes" for New Zealand

THE Government of New Zealand has ordered from the Gloster Aircraft Co. a number of Gloster "Grebe" single-seater fighters. It will become the first defence force in the Antipodes with up-to-date military aeroplanes of the single-seater class.

U.S.A. New Air Base

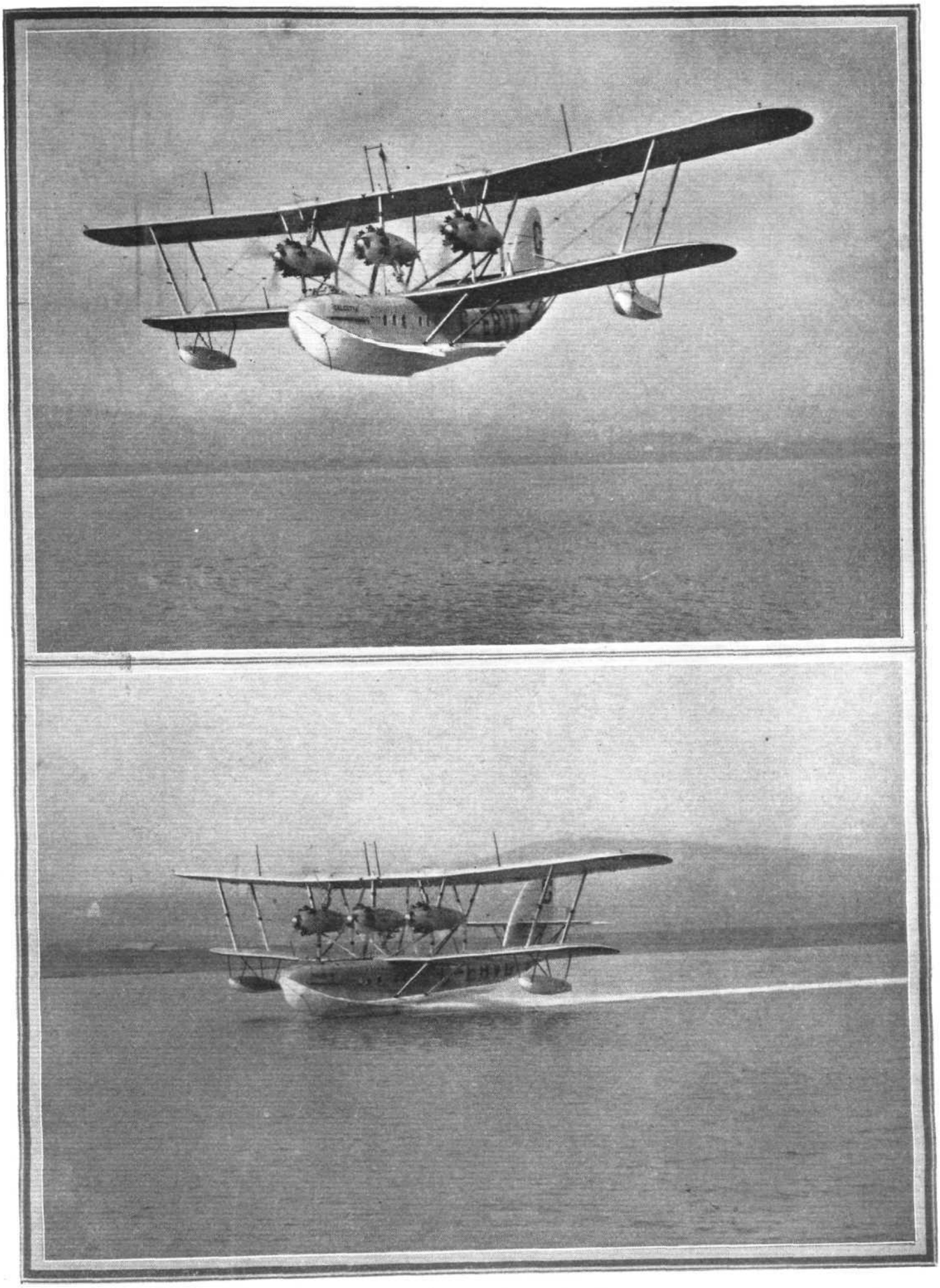
AT Los Angeles, the U.S.A. Air Service is erecting a large base. Its establishment will comprise 400 aircraft, two aircraft carriers of 33,000 tons each, and each holding 84 machines and 42 in reserve, an aircraft carrier with 30 machines, two tenders holding 12 Douglas bombing and reconnaissance machines, and six destroyers.

On the Cairo-Baghdad Air Mail

ON March 1 next, Wing-Com. R. M. Hill, M.C., A.F.C., F.R.Ae.S., will lecture before the R.Ae.S. and Inst.Ae.E. (at the Royal Society of Arts, 18, John Street, Adelphi, at 6.30 p.m.) on "Experiences on the Cairo-Baghdad Air Mail." A discussion will follow, which will be opened by Sir Arnold Wilson, K.C.I.E., C.M.G., D.S.O., the General Manager in Mesopotamia, Persia, and the Persian Gulf of the Anglo-American Oil Co., Ltd.

The First Transatlantic Flight

A MEMORIAL may be erected in honour of the first flight across the Atlantic from Newfoundland to Clifden, Ireland, made by the late Sir John Alcock and Sir Arthur Whitten-Brown in 16 hours 12 mins. on June 14-15, 1919, in a Vickers-Rolls-Royce machine. The distance covered was about 1,890 miles, and the two airmen won the *Daily Mail* prize of £10,000.



["FLIGHT" *Photographs*

THE SHORT "CALCUTTA": Views of the machine "planing" and in flight. In the lower photograph, note should be taken of the particularly "clean" running. The "Calcutta" will not only fly on two engines but will take off on two.

THE SHORT "CALCUTTA"

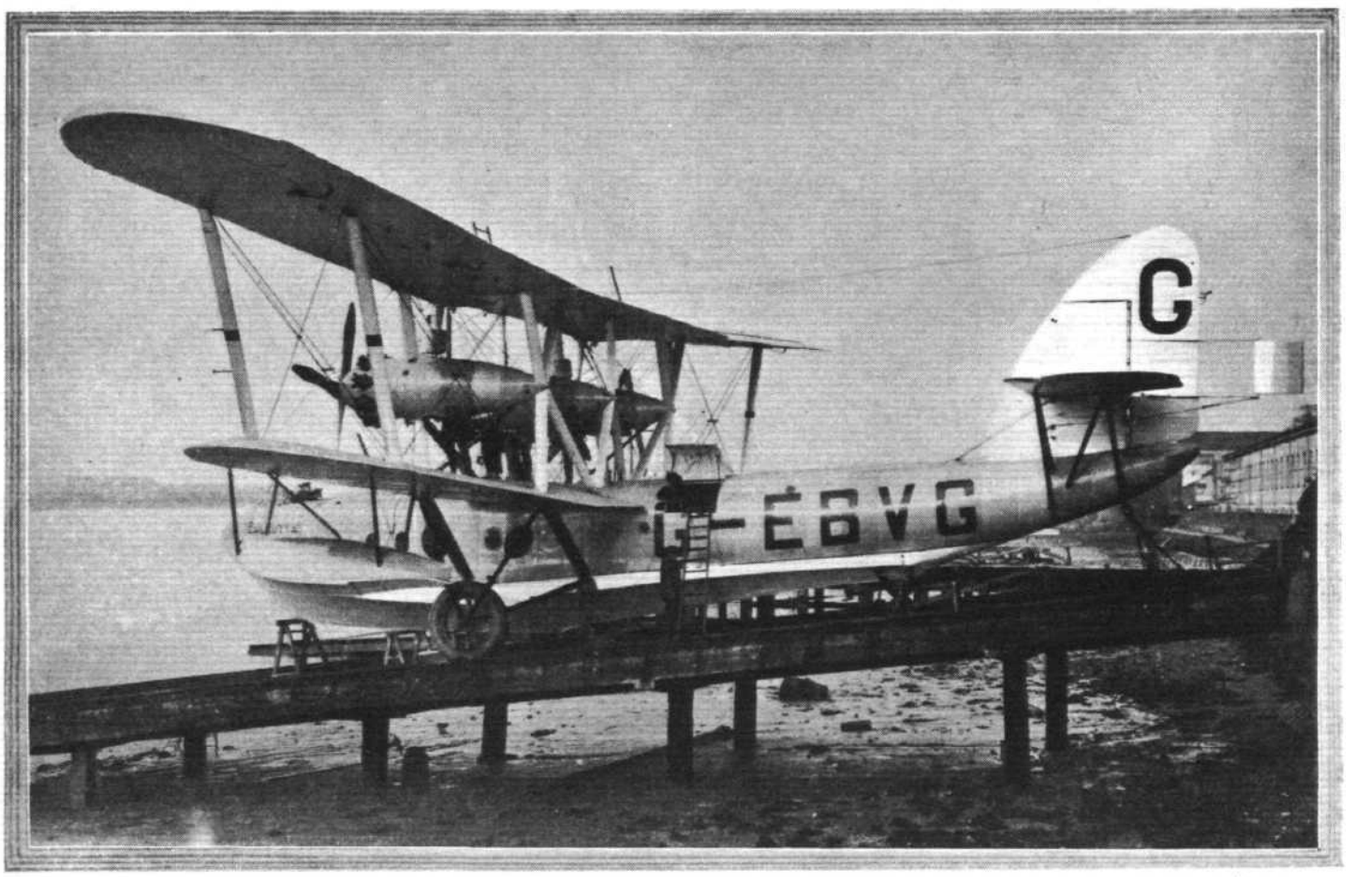
Britain's First All-Metal Commercial Flying-Boat

LAUNCHED at Rochester on Monday of last week, as recorded in FLIGHT, the Short "Calcutta" has been moored in the Medway off the Short works for several days, owing to the gales which prevented bringing her up the slipway and into the works. While this meant a great deal of anxiety on the part of the staff, because of the possibility of the machine dragging her moorings, it also gave an opportunity of testing the seaworthiness qualities of the new machine in an extremely strong wind. Let it be said at once that the "Calcutta" proved equal to the test. Rolling gently from side to side in the strong gusty wind, she rode as easily as a yacht, and in point of fact when one was aboard, as the writer had an opportunity of being for some two hours last week, one had very strongly the impression that one was aboard a yacht at anchor. In the cabin there was quiet, with but the slap-slap of the waves against the metal hull, but a visit "on deck" for the purpose of examining in some detail the mounting and cowling of the central engine very quickly brought home to one the force of the gale. So strong was this that it was necessary, in order to keep from getting blown in, to clutch hold of bracing wires, struts and anything else that offered a hand hold. The wind whistled in wires and struts, the rain beat down unmercifully on the wing fabric and drummed on it and on the metal roof of the cabin. Yet the machine appeared perfectly at home and in her element. If she is as steady in the air she will be a wonderful craft, and there is no reason to doubt that she will.

Driven below by the weather, we made a tour of inspection of the hull, and a most interesting tour it proved. "Shipshape and Bristol fashion" is an expression that inevitably comes to mind, and shipshape she certainly was, below as above, the "Bristol" fashion being, perhaps, more noticeable on deck, where the three "Jupiter IX" geared engines in their streamline nacelles gave promise of good air performance. But to return below decks.

The cabin of the Short "Calcutta" is a very roomy affair. There is about 6 ft. headroom, and the cabin is long and wide and gives an airy impression in spite of the fact that to get 16 seats arranged in the space available there is naturally no room wasted anywhere. Actually, the cabin has seating accommodation for 15 passengers, the sixteenth seat being for the steward who presides over a small galley and buffet just aft of the cabin. In front there is a sliding door communicating with the wireless compartment, which in turn leads to the pilot's cockpit. Aft of the cabin, and on the starboard side, opposite the galley, is a very roomy lavatory with tip-up wash basin. Aft of that again, and communicating with the cabin by a hinged door, is the luggage compartment, which is, as a matter of fact, the entire aft portion of the hull. And amazingly roomy it is with the total absence of any bracing members. Nowhere does one, perhaps, see to better advantage the special type of hull construction developed by Shorts. One can walk right up in the extreme stern to the rudder post (not that it would be advisable to do so during flight, as it might upset the trim), and although the luggage to be carried will naturally be collected and secured as close to the cabin as possible, it is obvious that, should the machine ever be used by a relatively few passengers for a protracted cruise, it would be extremely easy to fit up this aft portion of the hull with bunks, so that one could sleep comfortably on board. The fact that all petrol is some 15 ft. or so away from the cabin roof makes it perfectly safe to smoke in the hull, and half-a-dozen people could live very comfortably on board for long periods.

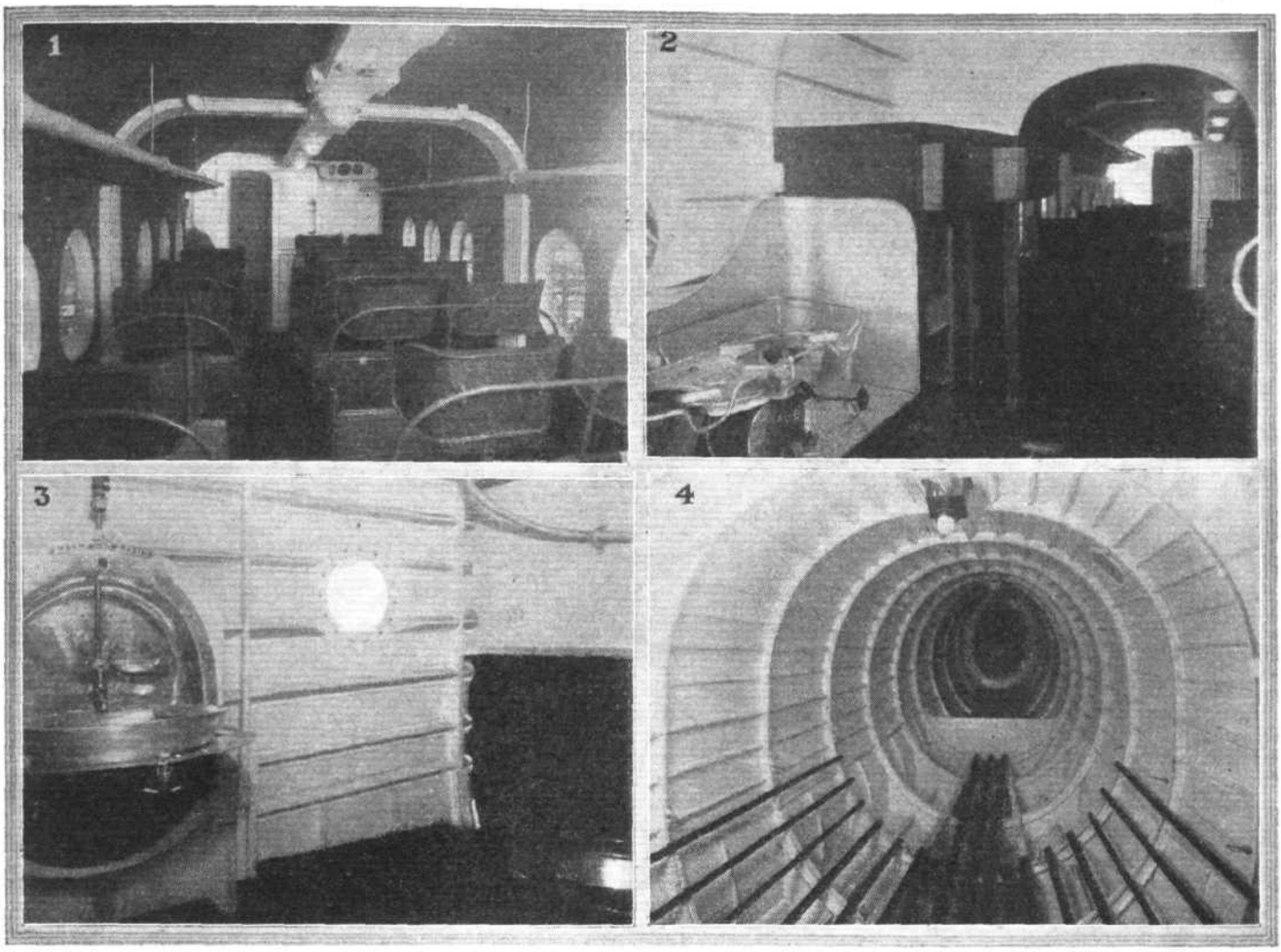
The cabin chairs are built of Duralumin tubes, and the extent to which it has been possible to reduce weight in this part of the equipment may be realised when we point out that the weight of a chair frame (without upholstery) is only 2 lbs.! The chairs are arranged with a single row down the port side and a double row down the starboard side, the



"FLIGHT" *Photograph*

THE SHORT "CALCUTTA": The machine on the slipway. Note the open luggage hatch.

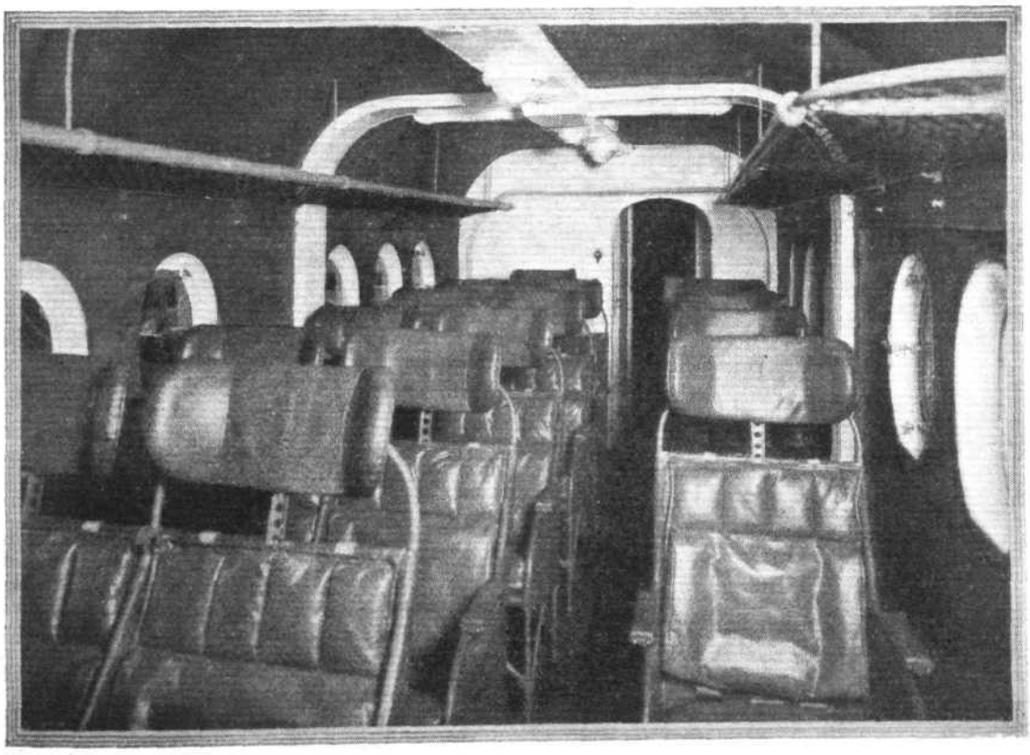
FLIGHT
THE AIRCRAFT ENGINEER AIRSHIP



THE SHORT "CALCUTTA": 1, view inside the cabin, looking forward. 2, the galley and buffet. 3, the lavatory, with tip-up wash basin. 4, view in the luggage hold, looking aft.

gangway between them being thus slightly off centre. The upholstery is in the form of air cushions, and another neat idea is that these cushions have been designed as lifebelts, being easily detached from the chairs and put on, a strap being provided for keeping them in place. Thus no extra weight of special lifebelts is incurred.

Large glass port holes of oval shape give plenty of light in the cabin. Even with the machine moored, and thus



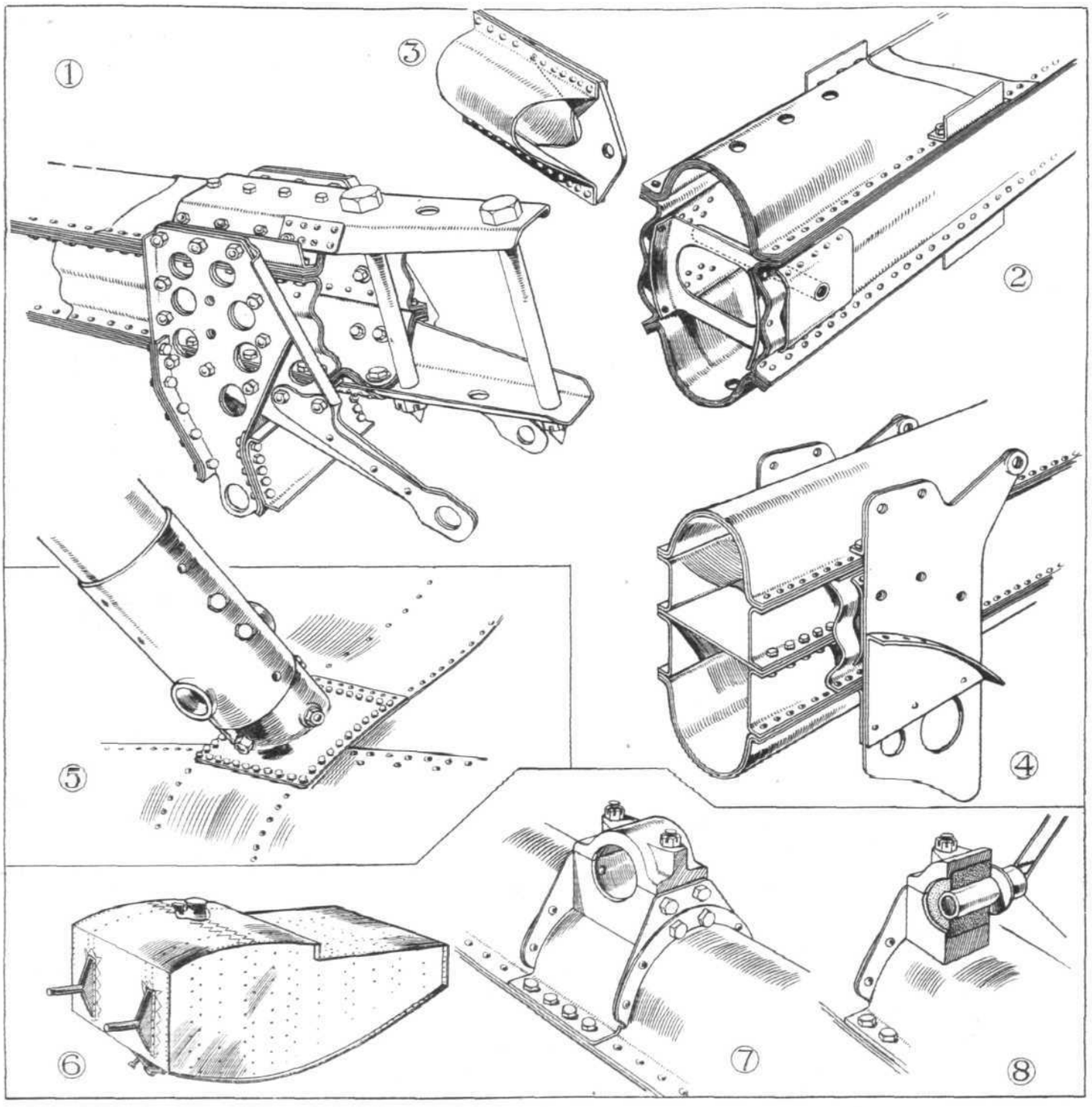
The Short "Calcutta": View in the cabin, looking aft.

with the lower plane fairly low over the water, the cabin is quite light. In flight, the amount of light which comes through the windows is naturally even greater, and the fact that the port holes are below the level of the lower wing gives the passengers an unobstructed view outward and downward.

The pilot's cockpit is very roomy, and as it is far forward in the hull, the view is particularly good. There are two seats, side by side, the port one being the pilot's, while the starboard seat has removable controls in front of it. Normally, the navigator will be in his wireless cabin, where a seat, table, map shelf, instrument lockers, etc., give comfort for working out a position as well as for sending and receiving messages. The machine is equipped with a Marconi AD.8 set, the range of the transmitting apparatus from the machine to a ground station being, under average conditions, 300-400 miles for C.W. telegraphy, 200-250 miles for telephony, and 240–280 miles for Tonic Train telegraphy. For use when the machine is on the sea, there is an emergency aerial on a telescopic mast attached to the upper wing. In addition to the normal radio equipment, the "Calcutta" carries Bellini-Tosi loops for purposes of direction-finding radio.

Two hatchways give access to the cabin and luggage compartment respectively, the cabin hatchway being on the port side, forward of the wings, and forming, when open, steps by means of which the passengers can easily get into and out of the cabin. The aft hatchway would also serve as an emergency exit in case, through any mishap, the forward one should be inaccessible.

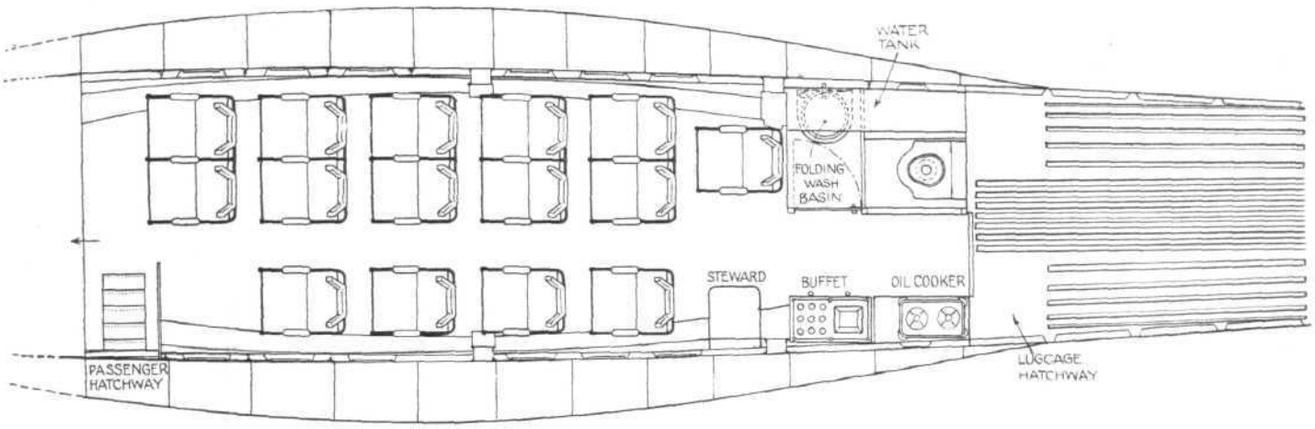
For transporting the "Calcutta" on land, a special beaching



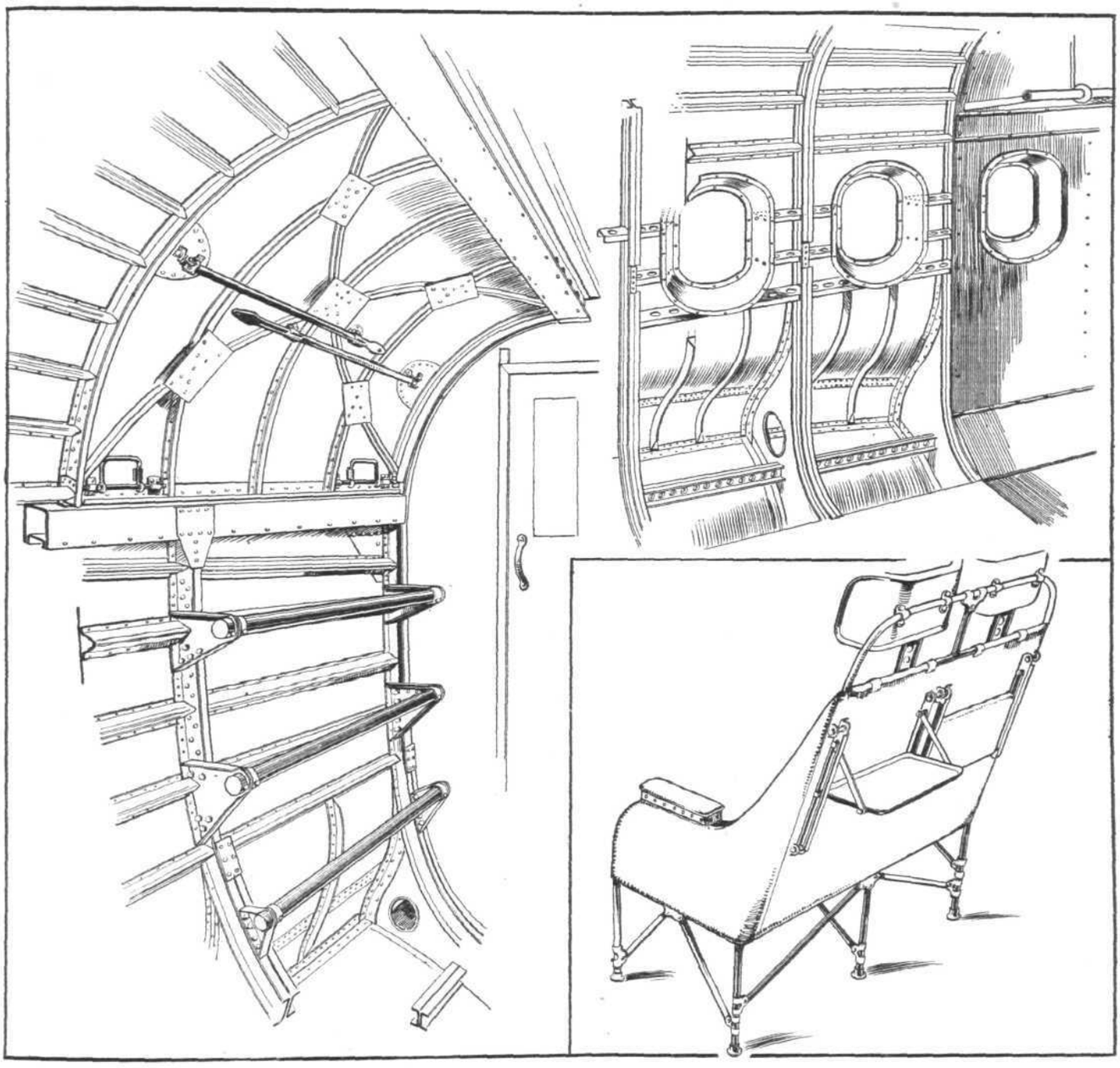
["FLIGHT" *Copyright Sketches*

THE SHORT "CALCUTTA" THREE-ENGINED FLYING BOAT: Some constructional details. A section of the rear spar of the top centre-section is shown in 1, with its steel fitting for strut and lift wires, etc. 2, shows a section of the top rear spar. Note the laminations which reinforce the spar at point of attachment of fittings. Built-up compression struts are used, the end of one being illustrated in 3. The spars of the lower centre-section differ slightly in construction, as shown in 4. The curved angle-section piece conforms to the cabin roof, through which this spar passes. The attachment of the raked struts which run from lower plane at engine supports to chine, meet the latter as shown in 5. The two petrol tanks are housed in the top plane, and are of the form shown in 6. Details of the tank supports, incorporating rubber buffers, are shown in 7 and 8.

FLIGHT



THE SHORT "CALCUTTA": Plan of the passenger accommodation.



["FLIGHT" *Copyright Sketches*

THE SHORT "CALCUTTA": On the left, a view inside the luggage compartment, showing the general construction, the special hatch which also serves as an emergency exit, and the tubular steps. When open, the hatch is kept raised by the two tubes shown folded in their clips. On the right, a portion of the cabin, showing construction, and, right, the finished cabin covered with material. Below is a double seat, with the neat folding tables provided for each passenger.

chassis has been designed, which incorporates two large aero wheels, the struts of which have quick-release attachments to the chine tubes and lower plane spar fittings. To prevent the tubes from sinking, they are provided with bladders, and the outside tubes have, in addition, a special form of quick-locking device so as to facilitate assembly while the machine is on the water. The two inner chassis struts and the halves of the outer chassis struts are permanently bolted to the wheel. The upper ends of the outer struts, however, are separate units, and when putting on the chassis, the two pins of the inner struts are secured first. Then the short upper ends of the outer struts are secured to the spar fittings, and the whole is secured by the special joints in the outer struts.

Constructional Features

The short "Calcutta" is an all-metal machine, the first commercial flying-boat of this type to be built in Great Britain. The material used is mainly Duralumin, which is employed for the entire hull, and for wing spars and ribs. Only a few stainless steel fittings are used, and a few steel struts. The wing covering is fabric.

The hull of the "Calcutta" is of the special Short patented type, in which, as will be familiar to our readers by now, there are no longitudinal members running through the hull. The frames are the main members, and the sheet plating is part of the stress-bearing structure, reinforced by V-section stringers, which, however, stop short at the transverse frames instead of being let into them.

The underwater body of the "Calcutta" is very nearly identical with that of the "Singapore" on which Sir Alan and Lady Gladys Cobham are now making a survey flight of Africa, but the shape above the water line is a good deal different, due chiefly to the fact that a large cabin for passengers had to be provided. Thus, instead of the pronounced sheer of the "Singapore," the "Calcutta" shows a nearly straight deck line from bow to stern.

The wing spars are of a type also specially developed by Short Brothers. Their general section will be seen in some of our sketches, and it will be noticed that they are laminated so as to proportion the strength to local loads. These spars are produced with remarkable ease and rapidity by very simple equipment, and have proved on test to develop practically the full strength of the material from which they are made.

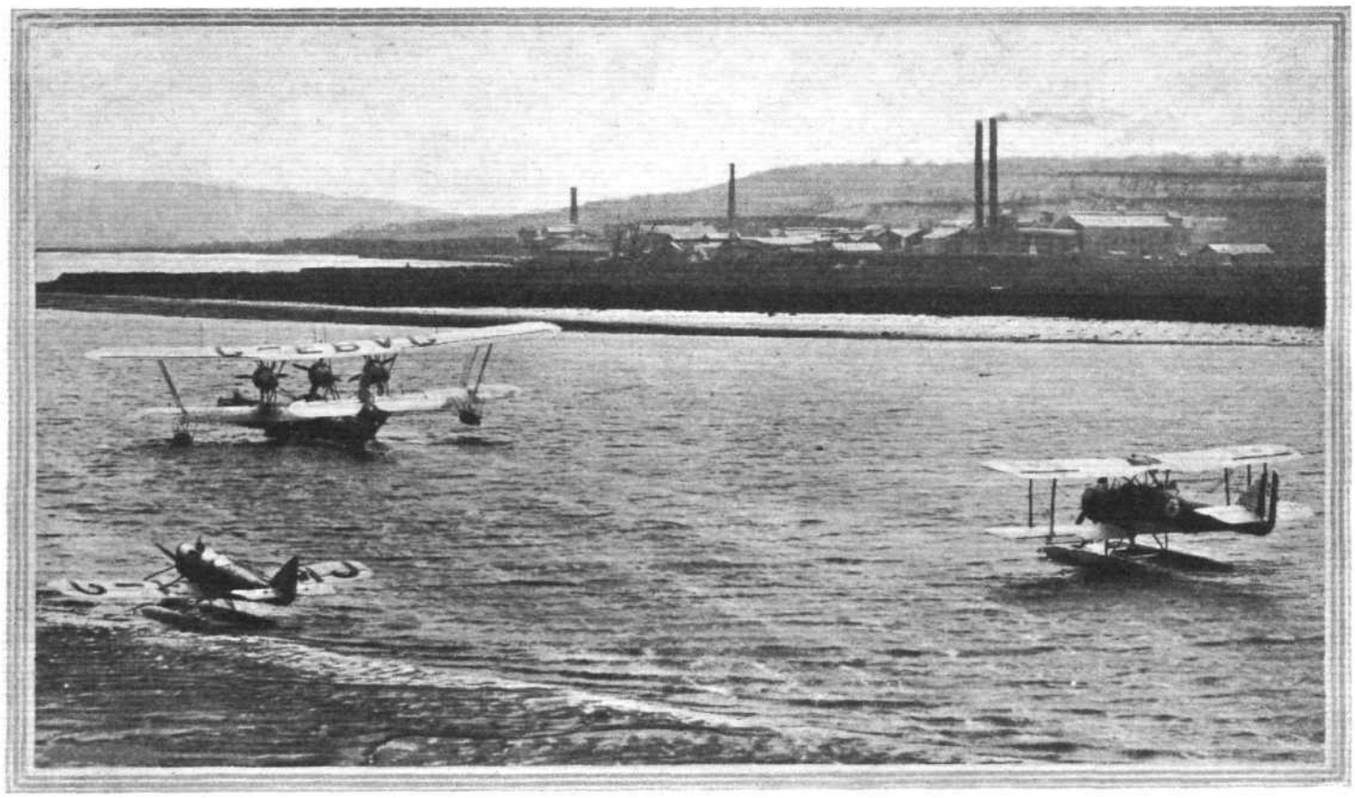
The ailerons are balanced by the Bristol-Frise type of balance and are fitted to the top plane only. The tail has monoplane surfaces, *i.e.*, a single rudder and a single tail plane. There is a large horn balance on the elevator, and also on the rudder, and the latter is operated by a small servo rudder mounted some distance aft of the main rudder. This type of control is becoming popular for large machines, as it reduces the load on the foot bar and enables a pilot to work with ease a rudder of even very large area. The principle of this type of rudder, which was, we believe, invented by the German engineer, Anton Flettner, also the inventor of the Flettner rotor, is, of course, simple enough. The pilot operates the small servo rudder, which in turn actuates the large rudder.

Engine Installation

The power plant of the Short "Calcutta" consists of three Bristol air-cooled "Jupiters," series IX, mounted side by side in the gap between the wings, and driving four-bladed airscrews. Each engine is neatly streamlined in a "power egg," only the cylinder heads projecting. In the illustrations published this week, the engines are shown with open exhausts, and a cowling over the front of the engines. Actually, they will be fitted with exhaust collectors, and the rings of these will be of the same shape as the present cowlings, so that the shape will be but little altered by this modification. Above each of the wing engine nacelles can be mounted a special crane or gantry, by means of which an engine can be lifted out of or put into the machine without external assistance. So effective have these cranes proved that they are used even when the machine is in the shops, as affording the easiest means of installing the engines. The details are shown in one of our photographs.

There is no petrol in the hull of the "Calcutta," the two petrol tanks being housed in the top plane, whence the fuel runs by direct gravity feed to the three engines, the piping being so arranged that all or either engine can be supplied from either or both tanks. The oil is contained in tanks behind the engines, inside the nacelles, and the tanks communicate with external oil coolers. A "Bristol" engine starter is installed in the central engine nacelle, whence it is arranged to start all three engines. This same starter engine

(*Continued on p.* 117.)



ON THE MEDWAY : This little seascape is of interest in showing three Short machines moored. In the background is the "Calcutta." On the left, the little "Mussel," which has been moored out for more than 2,000 hours, and on the right the "Sturgeon"

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

February 23, 1928

CONTENTS

EDITORIAL VIEWS

In this issue, Mr. Pollard carries out some interesting calculations relating to metal fuselage structures of "strip" and solid-drawn tubes. He arrives at the conclusion that, in the example taken, the weight of the solid drawn tube-structure, is, exclusive of weight of longeron fittings, 18 per cent. greater than the weight of the "strip" structure. As regards the fittings, he expresses the view that those for the "strip" fuselage will be lighter than some forms of joints used in tubular construction, but concedes that, in view of the recent production of some very light, if costly, joints for solid-drawn tubes, the weight of fittings may be taken as equal for the two types. The welded frame, he states, "would show up very badly indeed beside these two cases if mild steel tube was the material used."

As Mr. Pollard's article is by way of being a challenge to the advocates of certain other forms of construction, perhaps we may hear from readers with experience of these. For instance, it would be interesting to know how the new Sopwith-Sigrist form of flat-sided tube construction, developed by the Hawker Company, compares with Mr. Pollard's "strip" construction. Certainly, the Hawker fittings are about as simple as anything could be, and they could not by any means be called costly. While on the subject of Mr. Pollard's article, we should like to congratulate Mr. Miles, also of the Bristol Company, on his drawings of the "strip" structure. Mr. Miles has introduced a new style of sketching which, we think, lends itself admirably to showing technical details.

Mr. Munro is a newcomer to the pages of THE AIRCRAFT ENGINEER. He is, we understand, employed by the Gloster Aircraft Company, under Mr. Folland, and his article on "Seaplane Stability Calculations" should be of very great assistance to those who, having had no previous experience of such work, are suddenly called upon, as they may well be in these days of seaplane progress, to tackle it. Unfortunately, lack of space has compelled us to divide Mr. Munro's article into two instalments, but this was unavoidable. The concluding instalment will be published next month.

METAL CONSTRUCTION DEVELOPMENT.

By H. J. POLLARD, Wh.Ex., A.F.R.Ae.S.

(*Continued from Page* 3.)

Before amplifying some of the statements made in the previous article, we will study a simple feature of strip metal construction and demonstrate its advantages. In doing this, one or two of the principles governing economic structural design will appear, and later some observations on the method of manufacture will be made.

In Fig. 1 is shown a side view of a frame which might be a portion of a fuselage tail. Fig. 2 is a view in perspective of the structure, and Figs. 3 and 4 alternative nodal points. The bulkhead bracing has been omitted from Fig. 2 for the sake of clearness.

From these illustrations the details of the construction are quite clear, and no elaborate description is necessary.

For such a structure to be light, safe and rigid, two very important conditions must be fulfilled, and in certain special cases there is an equally important third condition. The first is that the built-up longitudinals must be continuous throughout their lengths. The best results cannot be obtained if the smaller of the two strips is cut away at intervals so that angular fittings may be secured to the flats of the larger section, because this would introduce a series of sections of discontinuity along the longerons with consequent substantial reduction of strength at these points. The second constructional feature to be observed is the method of securing the bracing members to the gusset plates.

These members consist of two similar sections riveted together along their edges, forming a circular or approximately circular sectioned member, having two diametrically opposite outwardly extending flanges. It might appear safe to cut off one of the component sections level with the outer edge of each of the gusset plates, forming a junction, as shown in Fig. 5. The only object in doing so would be to save a little weight, but here, again, the necessity for continuity makes it imperative that the strut ends be divided, a section passing either side the gusset. Two other advantages are derived from this, one being exact centroidal loading of the member, and the other that the securing components are put in double shear, thus making it possible to effect an appreciable saving in assembly time due to the use of fewer rivets. The third condition is only of importance when the struts are "short," that is, when they are subjected to considerable intensities of stress. The load is transferred to the main section of the struts through the narrow riveting edges, and these edges in consequence are subjected to a stress much in excess of the

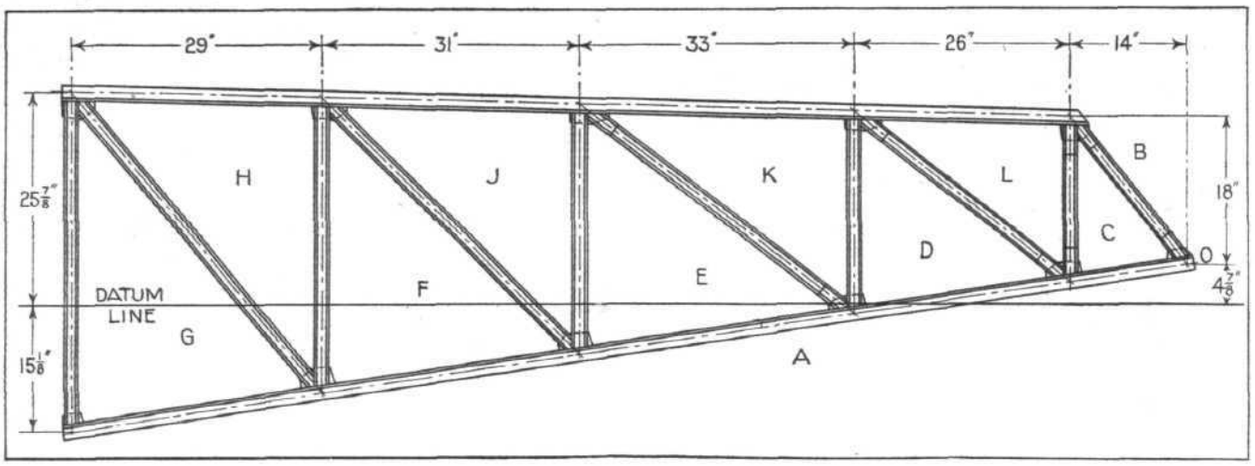


Fig. 1.

average P/A for the section ; this stress round the end rivets may exceed the compressive yield stress of the material, causing crinkling of the flats and premature end buckling of the whole section.

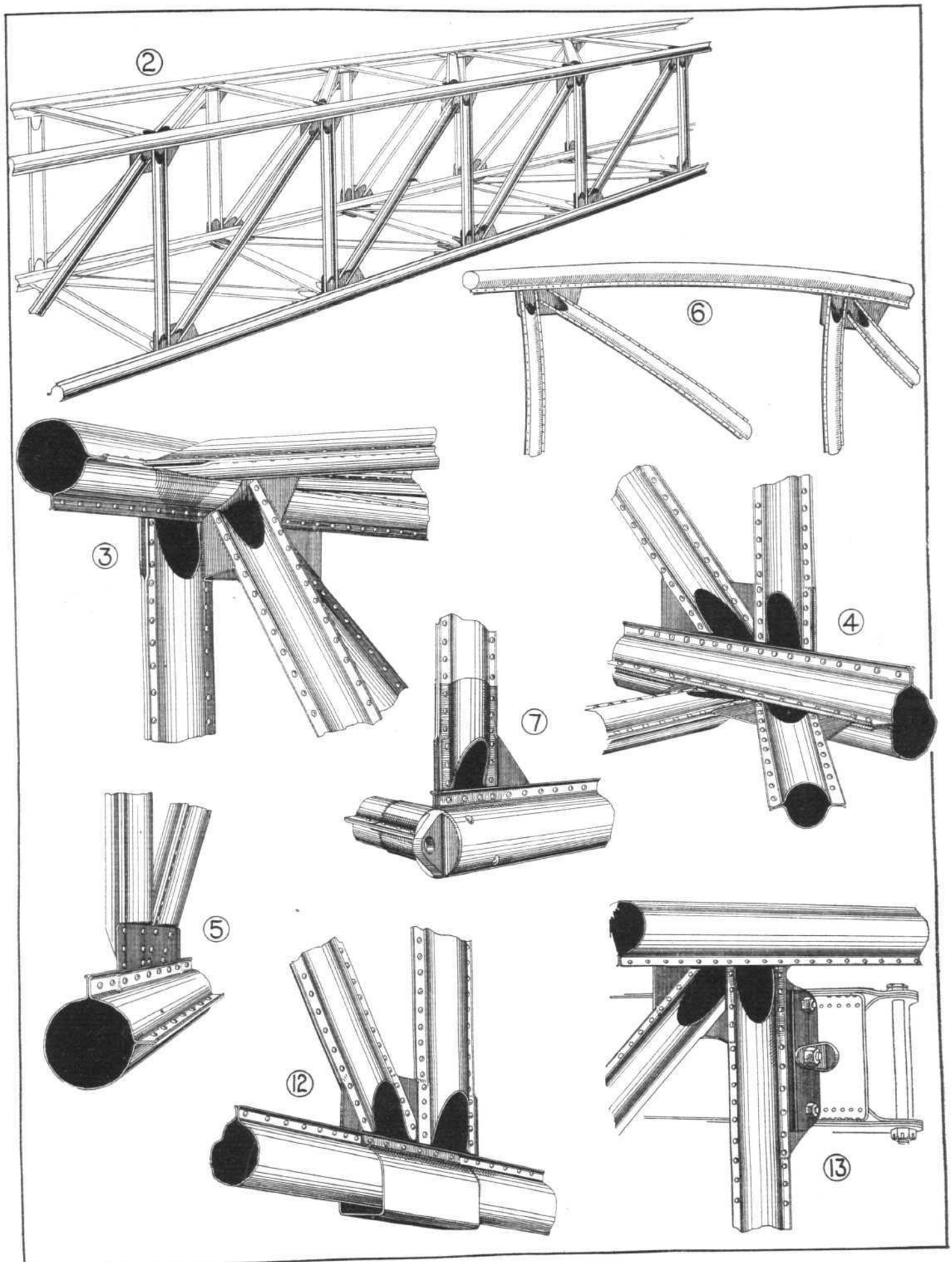
It might be possible to calculate the load at which the strut ends would fail if the direct forces only had to be considered, but owing to flexing of the compression boom and the change in shape of the frame bays due to the displacement of the panel points under load, a very complex stress system is set up round the rivets common to the bracing struts and gusset plates. The computation of this stress is not possible mathematically, but tests of a rather simple nature can easily be devised from which data can be obtained as to the end reinforcement necessary, so that the end of the struts may carry their loads up to the point of central failure by buckling. The " fixing " couples at the strut ends are probably of considerable magnitude ; the end load effect on the compression boom is to produce a condition as shown in Fig. 6, which, as stated, is resisted by the nature of the end connections of the bracing. It is seen, therefore, that a much greater radius of gyration is required in a strut about an axis at right angles to the line joining the riveting edges, than about the other axis of symmetry. Instead of the edges being " waste metal," as is sometimes alleged, they play a really large part in giving strength and rigidity to the frame, and apart from difficulties of riveting, if the edges are narrowed down excessively, it will be found on test that the struts will fail in the plane of the frame due to the above-mentioned causes.

In Fig. 7 is shown a simple method of counteracting the tendency to local end buckling. (Also in this figure is shown the socket attachment used for connecting one length of longeron to another length.)

Two short lengths of section wrapped round the strut ends and continued above the gusset a short distance are sufficient to distribute the load evenly across the section of the strut ; these reinforcements need securing only at the riveting edges, and not separately by rivets to the main body of the section. In cases of very high stress intensities, additional reinforcing may be made by means of a narrow strip the width of each riveting edge running the length of the strut, the thickness of which is equal to the thickness of the gusset plate. This

TABLE I.—FOR STRIP FRAME

	1	2	3	4	5	6	7	8	9
——	Member.	Length. L.	Area. A.	Radius of Gyration. K.	L/K	P/A=p.	P.	Actual Load in Member.	Description of Member.
Top Longerons	B L	26	0·05	—	—	—	8,300	550	Section as shown in Fig. 8 (0·009 ins. thick, S. 40).
	B K	33	0·05	—	—	—	8,300	1,280	
	B J	31	0·05	—	—	—	8,300	1,875	
	B H	29	0·05	—	—	—	8,300	2,260	
Bottom Longerons.	A C	14·2	0·05	0·43	33	107,500	5,350	555	Section as shown in Fig. 8 (0·009 ins. thick, S.40).
	A D	26·3	0·05	0·43	61·3	60,000	3,000	1,294	
	A E	33·4	0·05	0·43	77·7	42,000	2,100	1,900	
	A F	31·3	0·05	0·43	72·8	45,500	2,280	2,280	
	E G	29·3	0·05	0·43	68·0	51,000	2,550	2,560	
Vertical Struts	C L	20·6	0·022	0·27	76·3	42,000	925	700	Section as shown in Fig. 9 (0·006 ins. thick, S.40).
	D K	25·0	0·022	0·27	92·6	29,000	638	565	
	E J	30·8	0·0257	0·27	114	20,500	527	455	Section as shown in Fig. 9 (0·007 ins. thick, S. 40).
	F H	36·0	0·0257	0·27	133	15,000	385	385	
Diagonals	B C	23·0	0·031	0·4	57·5	64,000	1.980	900	Section as shown in Fig. 10 (0·006 ins. thick, S. 40).
	L D	33·5	0·031	0·4	83·7	35,500	1,100	930	
	K E	41·0	0·031	0·4	102·5	24,500	760	760	
	J F	44·0	0·031	0·4	111	21,000	650	530	
	H G	47·5	0·031	0·4	119	18,500	575	435	



not only lends stiffness to the free edge, but also obviates the necessity for "joggling" the edges where the strut leaves the gusset. None of these precautions is necessary in ordinary fuselage construction, except where landing and other large localised loads are applied to the structure. A method of securing bulkhead bracing is shown in Fig. 3; hitherto wires have been used, but from the experience gained to date, there appears to be no reason why wires should not be totally eliminated from the frames, and struts only used in their place. There are several things that could be argued in favour of such a structure, probably the most important point being the freedom of the rigid members from initial

TABLE II.—FOR SOLID-DRAWN TUBULAR FRAME.

	1	2	3	4	5	6	7	8	9
——	Member.	Length. L.	Area. A.	Radius of Gyration. K.	L/K.	P/A=p.	P.	Actual Load in Member.	Description of Member.
Top Longerons.	B L	26	0·057	—	—	—	7,000	550	$1\frac{1}{4}$ in. o/dia. × 28 S.W.G. (T.5).
	B K	33	0·057	—	—	—	7,000	1,280	
	B J	31	0·057	—	—	—	7,000	1,875	
	B H	29	0·057	—	—	—	7,000	2,260	
Bottom Longerons.	A C	14·2	0·057	0·425	33·3	78,000	4,450	555	$1\frac{1}{4}$ in. o/dia. × 28 S.W.G. (T.5).
	A D	26·3	0·057	0·425	62·0	50,200	2,860	1,294	
	A E	33·4	0·057	0·425	78·5	36,000	2,050	1,900	
	A F	31·3	0·057	0·425	73·5	40,400	2,300	2,285	
	A G	29·3	0·057	0·425	69·0	44,000	2,500	2,560	
Vertical Struts.	C L	20·6	0·029	0·21	98·0	25,000	725	700	$\frac{5}{8}$ in. o/dia. × 28 S.W.G. (T.5).
	D K	25·0	0·035	0·260	96·5	26,800	940	565	$\frac{3}{4}$ in. o/dia. × 28 S.W.G. (T.5).
	E J	30·8	0·035	0·260	118·6	18,600	650	455	
	F H	36·0	0·035	0·260	138·5	14,100	495	385	
Diagonals.	B C	23·0	—	—	—	—	1,050	900	4 B.A. tie rods.
	L D	33·5	—	—	—	—	1,050	930	
	K E	42·0	—	—	—	—	1,050	760	
	J F	44·0	—	—	—	—	1,050	530	
	H G	47·5	—	—	—	—	1,050	435	

stresses; apart from military aircraft, where members are liable to damage in action, there is no need for bulkhead bracing at all, since it is found experimentally, and by calculation, that such bracing does not affect the strength or rigidity of the structure. A panel point having no bulkhead bracing is shown in Fig. 4.

A simple comparative weight and strength estimate will be made of a structure as described, and a similar frame built from T.5 tube and wires.

The dimensions of the uni-planar structure are given in Fig. 1. It is assumed that a load of 800 lbs. is suspended from 0 and the flat frame is held at XX. Figs. 8, 9 and 10 are sections of longerons, ties and struts made from steel strip to Specification S. 40. These have been designed to support the loads given in column 8.

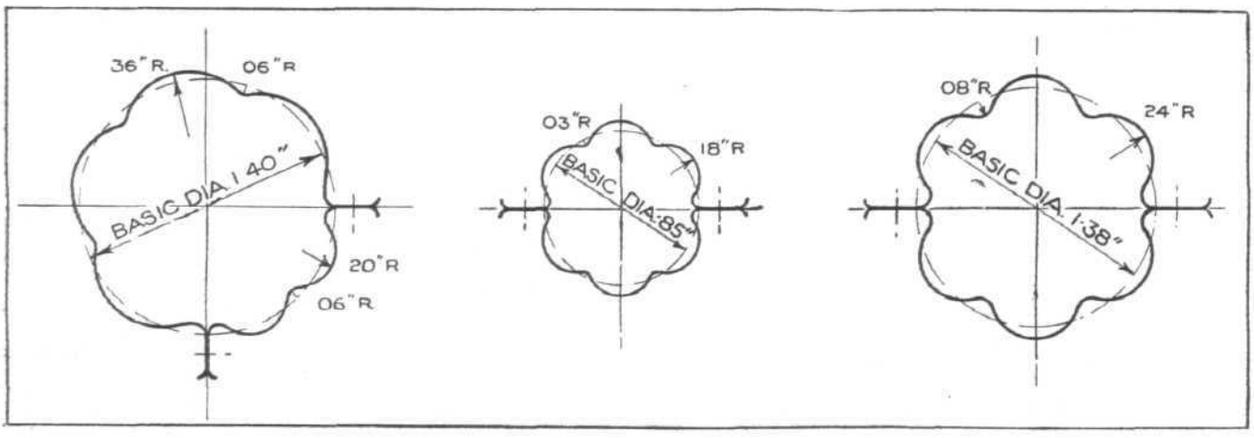
The sizes of the struts have been derived from the appropriate curve, as shown in Fig. 11.

In Tables I and II, the full particulars of the "strip" and "tubular" fuselages are given.

For the section of Table I marked "Diagonals," the load has been reversed; these members have to act both as ties and compression members, and obviously the case to consider is when these diagonal bracings act as struts. A moment's thought will show that this procedure does not alter the numerical value of the load in the members, but merely the signs.

In Table II it is assumed that these struts are replaced by two swaged wires, complete with fork ends and pins. In each case, column 1 denotes the member; column 2 its length, L; column 3 its area, A; column 4 the radius of gyration, K; column 5 the ratio, L/K; column 6 the corresponding value of stress, P/A, obtained from the graph; column 7 the loads from columns 6 and 3; in column 8 the forces induced by the applied load; and in column 9 a description of the member is given.

A comparison of the figures in column 7 in the tables gives the relative strengths of the two frames, which, in the worst cases, are approximately equal. A simple computation of the relative rigidities of these frames is not possible, but tests which have been made show this to be decidedly in favour of the strip construction. From the lengths and areas of members given, the weight of each is quickly derived;



Figs. 8, 9 and 10.

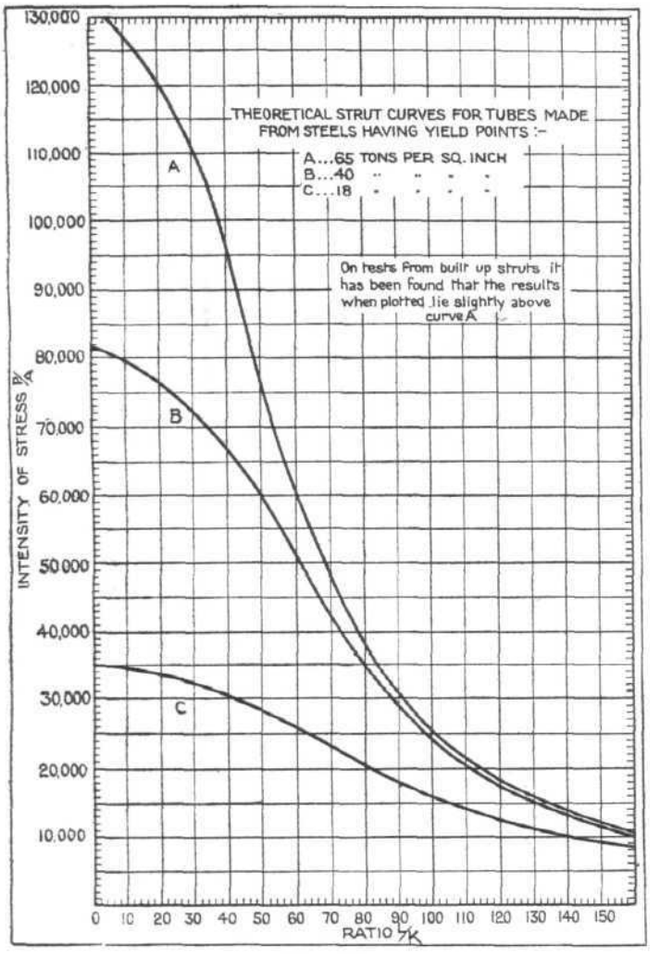


Fig. 11.

allowance must be made for tube sockets, pins, fork ends, rivets, etc., exclusive of longeron fittings, the percentage increase in weight of the wired over the strip frame is found to be 18 per cent. There is also the weight of fittings to consider. The gussets would be 24 G., with suitably-shaped lightening holes. These would certainly be lighter than some forms of joint used in tubular construction, but as recently several very light, if costly joints for solid drawn tube work have been designed, it may be assumed that the weight of fittings is equal in each type of structure.

The above is a fairly complete weight comparison of two methods of steel construction. A welded frame would show up very badly indeed beside these two cases if M.S. tube, the strut curve of which is shown on the chart, was the material used. Molybdenum or manganese steels would show up better, but it has been admitted that where tubes have been used, notably in America, finished structures are on the heavy side. This is probably due to the fact that it is not considered safe to join tubes by welding where the wall thickness is less than 22 G. It should be noted that if the material of the gussets is distributed over all the corrugated members, the thickness of the material would only be raised one-and-a-half thousandth of an inch. This fact should give the welding enthusiast food for thought.

To further this comparison, it should be stated that the sections shown in Figs. 8 to 10 are practical propositions, although it would be wrong to give the impression that, without some experience on the part of the producer, such sections could be readily made. The question of the assembly of these members will be dealt with in a later article. A more favourable case could have been made out for the tubular structure if a larger diameter and thinner gauge of T. 5 had been taken, but comparison with a tube outside the practical commercial range is useless. Tubes are now being offered to the aircraft industry of quality superior to T. 5, and these are said to be quite suitable for structural work : the above comparison, therefore, may need revising as experience with these higher tensile tubes is obtained. Advances are, however, to be expected in the design and methods of manufacture of components made from steel strip.

It is not suggested that the whole weight of 800 lbs. could be taken locally on the strip longeron section, but the same remark applies to the solid drawn tube. Provision for resting on trestles, lifting, etc., is easily made, and a fitting and method of attachment suitable for this is shown in Fig. 12.

The above comparison is presented in as simple a way as possible. At the same time, the overall dimensions and externally-applied loads are such as might apply to a portion of the structure of an aeroplane of 4,500 lbs. gross weight or thereabout. If the investigation is pursued further, it will still be found to favour the strip construction, particularly in the matter of fittings for the attachment of equipment, control surfaces, cable guides, etc. ; the numerous " free edges " obviously lend themselves to this purpose. One such type of fixing is shown in Fig. 13. This is a tail plane spar attachment.

Space does not permit of further illustration or description of fittings, but in general, a simple bent or flat plate is all that is necessary ; there is a sharp contrast between this and the machined fittings or clips with bolts that are common to tubular construction.

While the writer believes that aircraft frames as described have only been built by the Bristol Aeroplane Co., yet descriptions and drawings of the various component sections have appeared from time to time ; for instance, particulars of bracings made from two similar semi-circular channels joined together along their edges were advocated for aircraft more than 30 years ago ; similarly, drawings of longerons made from two parts shaped approximately as illustrated above have been published fairly recently, but such longerons have been shown discontinuous along their lengths, and it may be that this lack of continuity has been the reason for the abandonment of the method. Only one aspect of this construction has been dealt with : it may be possible in the future to describe further developments along these lines.

SEAPLANE STABILITY CALCULATIONS.

By WILLIAM MUNRO

In the design of seaplanes it is quite as necessary to determine by calculation the statical stability of the machine on the water, as in the case of ocean-going vessels, and the calculations involved are solved along very similar lines.

The statical stability is defined as the tendency the seaplane has to return to the upright when inclined from that position, say by wind or waves.

This stability is measured by a comparison of the " metacentric height " calculated for any given machine with the metacentric height of similar craft known to be successful, and is very largely a matter of experience and tabulated data It is proposed to outline the method adopted.

Fig. 1. Shows the machine inclined at a small angle, and indicates the two equal forces acting.

(i) Wt. acting down vertically through the C.G.

(ii) Buoyancy acting vertically up through the new centre of buoyancy ; that is, the C.B. with machine tilted.

When the machine is tilted, the total displacement remains the same, but the *shape* of the underwater surfaces changes, so that the centre of buoyance—which is the centre of gravity of the underwater volume—also changes from B to B_1.

The point M where the vertical through B_1 cuts the centre line of machine, is termed the transverse metacentre.

If, now, a line is drawn GZ perpendicular to the vertical through B_1, then the equal forces (i) and (ii) act at a distance GZ from each other, and the moment tending to right the seaplane is WxGZ.

As the point M is generally assumed to remain constant for small angles of heel—to about 8°—we can substitute for GZ and say that the righting moment, or moment of statical stability is $W \times GM \sin \theta$.

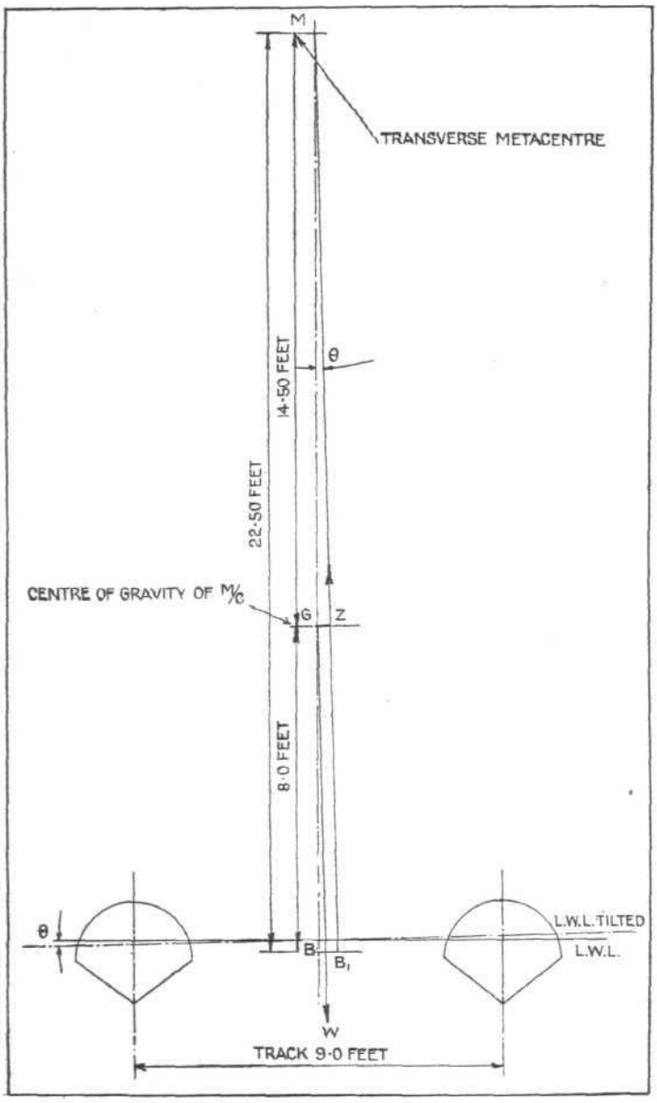


Fig. 1.

If the point M should be below G the resulting couple would tend to overturn the boat. This is the case in most flying boats, and the volume of the wing-tip floats is calculated to overcome this tendency to roll over.

A glance at Fig. 1 will show that a large amount of metacentric height—*i.e.*, the distance G.M.—means a quick "snatch-back" to the upright position. It is because of this that naval architects design for a minimum G.M., compatible with safety, to eliminate unnecessary discomfort to passengers and a minimum of "wracking" of the structure.

An important point on seaplanes is the necessity of having ample propeller clearance from the bow-wave system, which may easily wreck even a metal airscrew.

The point M shown in Fig. 1 is termed the transverse metacentre, and is governed by the shape of the floats and their distance apart; its distance from G is used as a measure of the seaplane's stability when rolling from side to side.

When considering the longitudinal movement of the machine in the water, we have another point to consider which is termed the longitudinal metacentre. See Fig. 2.

The transverse metacentre is the more important, but to find either position we must first determine the position of the centre of buoyancy and then show how the distance B.M. is fixed.

The following calculations are necessary :—

1. Total displacement of the float.
2. Area of load water plane.
3. Centre of flotation.
4. Moment of inertia of the load water plane.
5. Displacement to load water line.
6. Position of centre of buoyancy.

For the sake of clearness we will take each separately.

The designed shape of the floats for the purpose of this article is assumed to be already determined, and the method of checking out the statical stability only is being considered.

The offsets are given in table below for the assumed float designed and the calculations throughout are based on this shape.

Station.	Below Keel.	Datum Deck.	Chine Below Datum.	Chine Half-Brdths.	Radius of Deck.
12	5·35	5·35	5·37	—	—
11½	17·1	2·8	10·02	9·1	9·38
11	21·4	1·22	13·9	12·3	11·98
10	27·18	0·05	19·0	15·78	15·47
9	29·5	0·0	21·9	17·1	17·08
8	30·25	0·0	23·2	17·38	17·38
7	30·06	0·0	23·4	17·2	17·19
6	29·8	0·0	23·6	16·86	16·86
Top of Step	28·7	0·0	21·47	16·86	16·86
5	26·0	0·0	19·05	16·4	16·29
4	23·3	0·0	16·70	15·77	15·02
3	20·6	0·0	14·34	14·4	13·45
2	17·9	0·0	11·87	12·3	10·68
1	15·3	0·0	10·50	8·6	6·75
½	14·0	0·0	10·46	5·56	4·07
0	12·6	0·0	12·62	—	—

It is assumed also that the flotation system is the normal twin-float type with rounded deck and vee-bottom, not fitted with hydrovanes or stern stabiliser.

Taking calculation 1, we will refer to Fig. 3.

The volume shown shaded below the load waterline represents the displacement of the float, and is equal to one-half the weight of machine; in this case 2,427 lbs. or $\frac{2,427}{64}$ cubic feet.

The volume of the float above the waterline represents the "reserve of buoyancy." This may be taken as 90 per cent. minimum of the "displacement."

Therefore, we have:—

Weight of machine = 2,427 × 2 = 4,854 lbs.

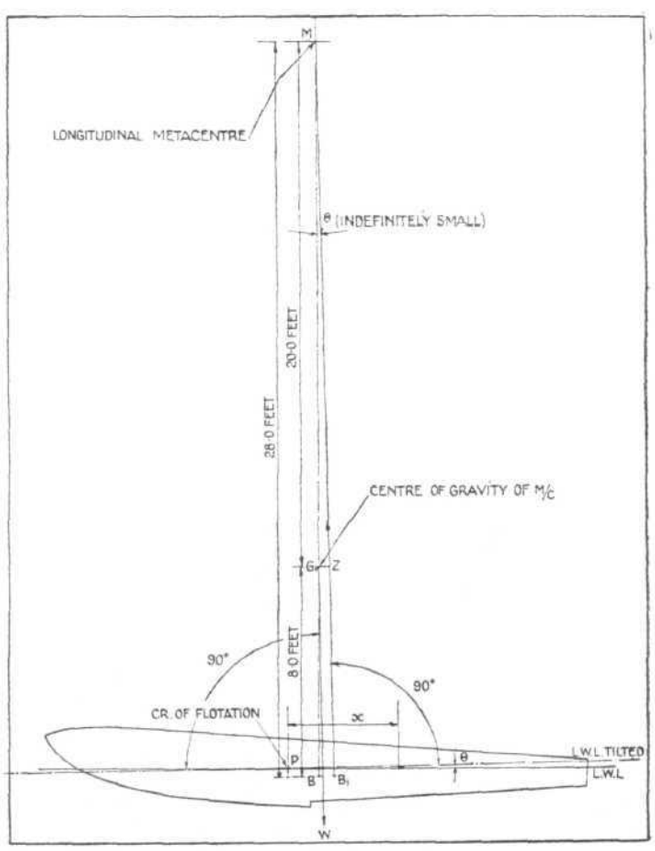
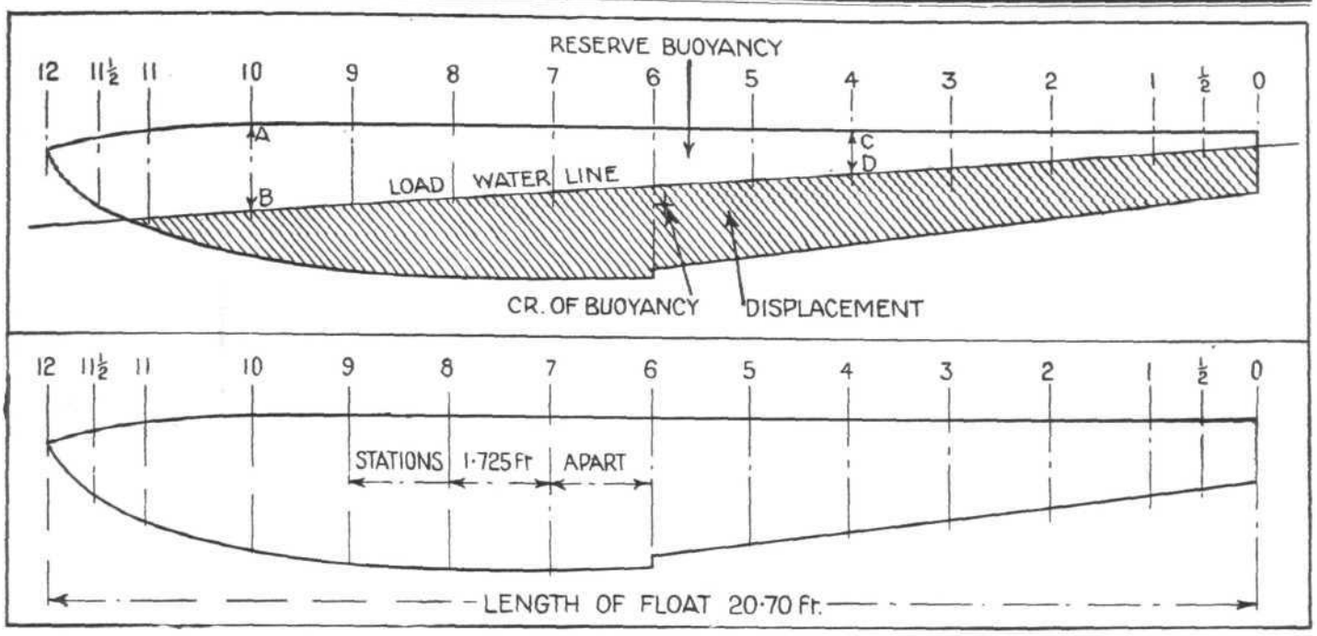


Fig. 2.



Figs. 3 and 4.

Reserve buoyancy = 90 per cent. of 4,854 lbs. = 4,368 lbs.
Total volume required = 4,854 + 4,368
= 9,222 lbs.

As this is taken on two floats we get :—

$$\text{Total volume required for one float} = \frac{9{,}222}{2} = 4{,}611 \text{ lbs.}$$

The length L of the float is divided into 12 equal stations, as shown in Fig. 4.

By using the planimeter over the body-plan (Fig. 5), the area of each half-section is quickly found, and the results are tabulated as below :—

1 Station.	2 Area of Half-section in sq. ft.	3 Simpson's Multiplier.	4 Functions of Areas.
12	0·0	½	0·0
11½	0·57	2	1·14
11	1·16	1½	1·74
10	2·10	4	8·40
9	2·68	2	5·36
8	2·73	4	10·82
7	2·71	2	5·42
6	2·70	4	10·80
5	2·16	2	4·32
4	1·76	4	7·04
3	1·41	2	2·82
2	0·99	4	3·96
1	0·63	1½	0·94
½	0·37	2	0·74
0	0·0	½	0·0
			63·50

$$\text{Total volume of float} = 63{\cdot}5 \times \frac{1{\cdot}725}{3} \times \frac{2}{1} \times 64 = 4{,}630 \text{ lbs.}$$

For each station the area in column 2 is multiplied by the multiplier given in column 3, the result being placed in column 4 under Functions of Areas. The Functions of Areas are totalled up, multiplied by one-third of the interval between stations in feet, and this result multiplied by two, to include both sides of the float. Multiplying further by 64 brings the result to lbs.

This checks the size of the float and, as already shown, should, in the case taken, be at least 4,611 lbs.

As Simpson's Multipliers are universally used, it is not considered necessary here to do more than show the method of their application in each instance.

2. *Area of Load Water Plane.*

On the body plan (Fig. 5), which represents sections at each of the stations numbered upon Fig. 3, we now draw in the load water line on each station. These positions are transferred from Fig. 3, *e.g.*, AB on Fig. 3 is equal to AB on Fig. 5, and CD on Fig. 3 is equal to CD on Fig. 5.

The half-breadths of these waterlines are set out as shown in Fig. 6, and the area of the load water plane found by tabulating as below :—

1 Station.	2 Semi-Ord. (in ins.).	3 Simpson's Multiplier.	4 Functions of Areas.
12	0·0	½	0·0
11½	6·0	2	12·0
11	12·0	1½	18·0
10	16·1	4	64·4
9	16·8	2	33·6
8	17·0	4	68·0
7	17·0	2	34·0
6	16·0	4	64·0
5	15·0	2	30·0
4	13·5	4	64·0
3	11·5	2	23·0
2	8·5	4	34·0
1	5·5	1½	8·25
½	4·0	2	8·0
0	0·0	½	0·0
			461·25

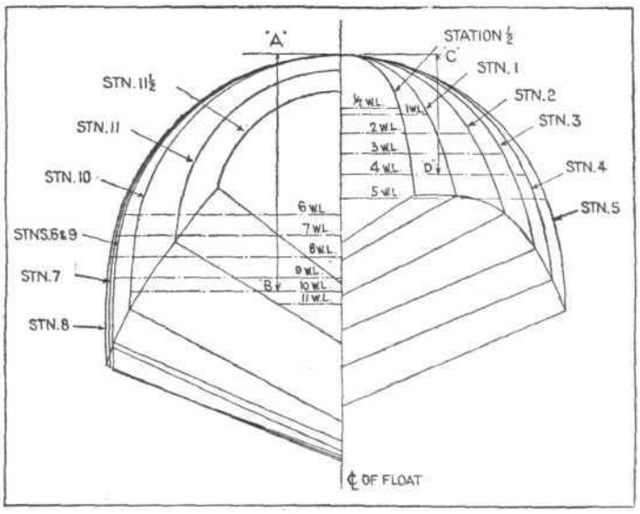


Fig. 5.

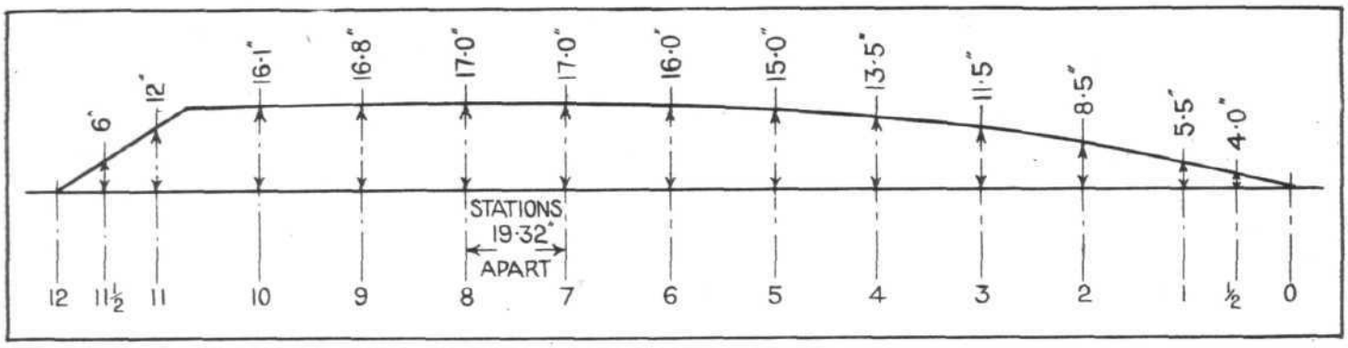


Fig. 6.

$$\text{Area} = \frac{461\cdot25}{1} \times \frac{19\cdot32}{3} \times \frac{2}{1} \times \frac{1}{144} = 41\cdot25 \text{ sq. ft.}$$

The area of the load water plane is found by total of functions of areas multiplied by one-third the interval between stations, and this result multiplied by two for both sides of the float.

As the ordinates used are measured in inches we then divide by 144 to bring the result to square feet.

Finding the position of the load waterline is a matter of judgment and "trial and error." The first consideration is water-clearance for the airscrew, which fixes the position of the floats below the fuselage. The trim fore and aft depends upon the nature of the machine.

3. *Centre of Flotation.*

For transverse inclinations the centre of flotation, which is defined as the centre of gravity of the water plane, is taken as on the centre line of machine, but the position of centre of flotation for inclinations fore and aft must be calculated. As we are dealing first with the transverse metacentric height we will leave this calculation for the moment and pass on to No. 4.

4. *Moment on Inertia of Waterplane.*

This must be found :—

(*a*) About the C.L. of float. (*b*) About the C.L. of machine.

4 (*a*) is tabulated as follows :—

1	2	3	4	5
Station.	Semi-ords. in ft.	Cube of Semi-ords.	Simpson's Multiplier.	Functions of Cubes.
12	0·0	0·0	½	0·0
11½	0·5	0·125	2	0·25
11	1·0	1·0	1½	1·50
10	1·34	2·4	4	9·60
9	1·40	2·74	2	5·48
8	1·42	2·85	4	11·40
7	1·42	2·85	2	5·70
6	1·33	2·35	4	9·40
5	1·25	1·95	2	3·90
4	1·12	1·40	4	5·60
3	0·96	0·88	2	1·76
2	0·71	0·35	4	1·40
1	0·46	0·09	1½	0·135
½	0·33	0·036	2	0·072
0	0·0	0·0	½	0·0
				56·197

Moment of inertia about centre line of float

$$= \frac{56\cdot2}{1} \times \frac{1\cdot725}{3} \times \frac{2}{3} = 21\cdot54$$

The moment of inertia about the centre line of float is found by adding up the functions of cubes, multiplying this by one-third of the interval between stations, and multiplying the result by two-thirds.

Let I = moment of inertia of W.P., about C.L. of float and let I_0 = moment of inertia of W.P., about C.L. of machine.

Then $I_0 = I + (\text{area of W.P.} + \frac{1}{2} \text{ track}^2)$

$$= 21\cdot45 + \left(41\cdot25 \times \frac{9^2}{2}\right)$$

$$= 856\cdot8.$$

Then I_0 for both floats $= 2 \times 856\cdot8 = 1713\cdot6$.

(*To be concluded.*)

TECHNICAL LITERATURE.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

A DISCUSSION OF THE LAW OF VARIATION OF ENGINE POWER WITH HEIGHT.

By H. GLAUERT, M.A.

R. & M. No. 1099 (E. 25). (7 pages.) March, 1927. Price 4*d*. net.

As a result of a long series of experiments at the Royal Aircraft Establishment, it appears that the power of an engine is a function of the pressure rather than of the density. Recently, Mr. Capon* has suggested that the law should be defined more precisely as a function of pressure to the two thirds and density to the one third power. Other investigations at the R.A.E. have previously been published as R. & M. Nos. 462,† 960‡, and 961§.

The whole question of the variation of engine power with height has been reviewed, and the experimental results have been examined to find confirmation or otherwise of Mr. Capon's suggestion.

The relative importance of pressure and density in determining the power of an engine appears to vary with height, and different methods of experiment lead to slightly discordant results. The simple pressure law is undoubtedly better than the simple density law, and for greater refinement Mr. Capon's suggestion should give a very close approximation to the truth.

* R. & M. 1080.—The Reduction of Performance Tests to the Standard Atmosphere.—By R. S. Capon.

† R. & M. 462.—The Variation of Engine Power with Height.—By Pinsent and Renwick.

‡ R. & M. 960.—Variation of Engine Power with Height.—By H. L. Stevens, R.A.E.

§ R. & M. 961.—The Variation of Engine Power with Height.—By H. M. Garner and W. G. Jennings, R.A.E.

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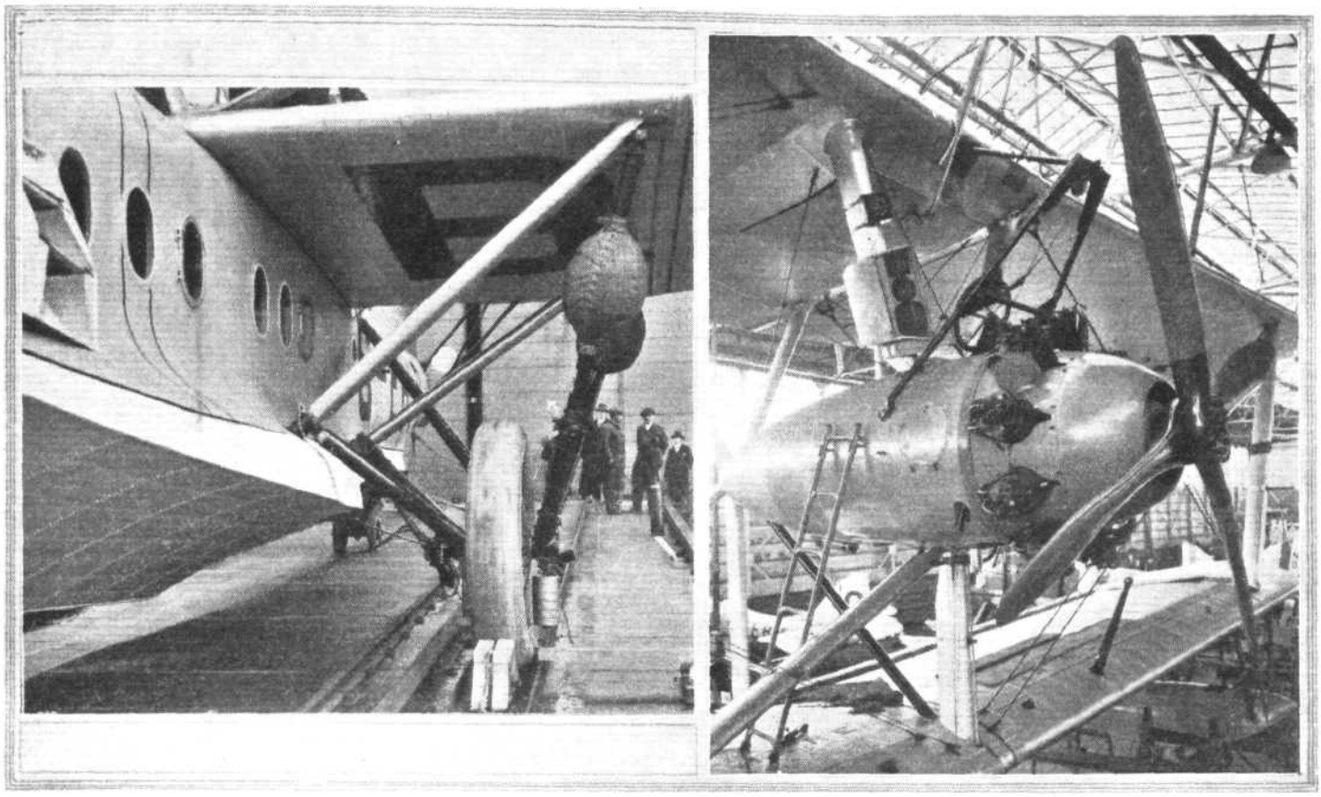
AERODYNAMIC INTERFERENCE.

We very much regret that Mr. Stanley H. Evans has been so busy recently in other directions that he has not been able to find the time to complete his second article on "The Problem of Aerodynamic Interference" in time for it to be included in the present issue. We are, however, promised an interesting instalment for next month.—ED.



THE SHORT " CALCUTTA " : On the left, a " close-up " of the beaching chassis. The front hatch, which also forms steps, can just be seen. On the right, the port wing engine. Above the nacelle can be seen the crane, used for lifting the engines into and out of the machine. In the photograph, the engine has open exhaust. A collector ring, shaped liked the cowl in the photograph, will be fitted later.

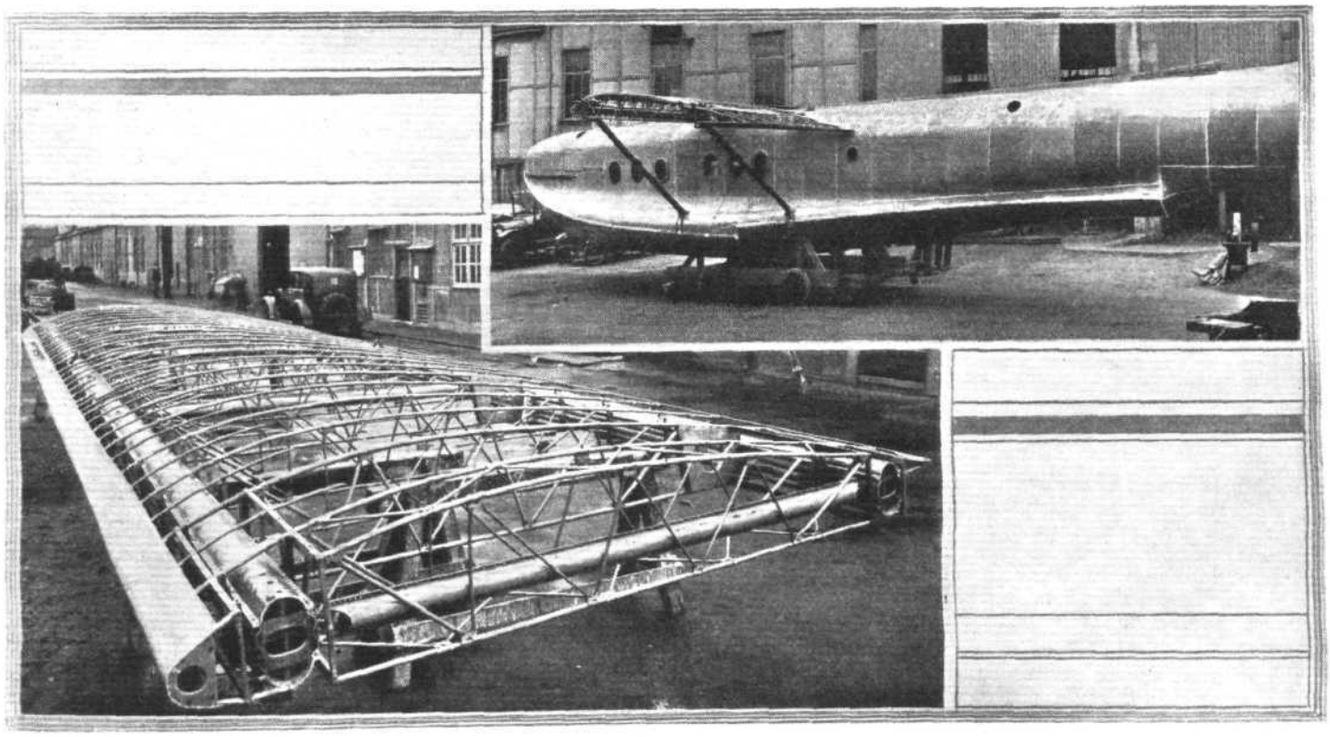
(*Concluded from p.* 116)

has also been arranged to drive a mechanically-operated bilge pump as well as the general purpose dynamo for lighting and radio when the main engines are not running.

Specification

As the general arrangement drawings of the Short " Calcutta " were published in a recent issue of FLIGHT we do not propose to reprint them here.

The main dimensions and areas are: Span of upper plane, 93 ft. (28·35 m.); span of lower plane, 76 ft. 6 in. (23·15 m.); total wing area, including ailerons, 1,825 sq. ft. (170 m²); length, o.a., including servo rudder, 64 ft. 9 in. (19·75 m.); wing chord, 11 ft. 6 in. (3·51 m.). Area of ailerons (total), 150 sq. ft. (13·95 m²); area of tail plane, 112 sq. ft. (10·4 m.²); area of elevators, 105 sq. ft. (9·76 m.²);



THE SHORT " CALCUTTA " : On the left, a wing in skeleton, and on the right, the hull. Note particularly the faired rear step.

area of fin, 56 sq. ft. (5·2 m.²) ; area of main rudder, 49 sq.ft. (4·55 m.²) ; area of servo rudder, 7·6 sq. ft. (0·706 m.²). Weight of machine empty, 12,600 lb (5,730 kg.) ; weight fully loaded, 20,200 lb. (9,185 kg.) ; weight available for load, 7,600 lb. (3,455 kg.). The available load may be composed as follows: A crew of three, with baggage, food and water, 768 lb. (319 kg.), and 320 gallons of petrol and 30 gallons of oil, 2,730 lb. (1,241 kg.). Wireless, electrical equipment, instruments, fire extinguishers, cooking and marine equipment account for a weight of 562 lb. (255 kg.), leaving a pay load of 3,540 lb. (1,610 kg.), which is equivalent to 15 passengers with baggage, food and water (at 236 lb. per head). The fuel and oil capacity given does not represent the maximum, as the tanks have been designed to hold 480 gallons of petrol and 45 gallons of oil, so that by sacrificing a certain amount of pay load the range can be correspondingly increased. With the quantities mentioned, the range is 5½ hours, or 500 miles (805 km.), and with full tanks and a smaller pay load the duration is 8·2 hours, and the range 740 miles (1,190 km.). The wing loading is 11·05 lb./sq. ft. (54 kg./m.²), and the power loading (at full power) 12·8 lb./h.p. (5·83 kg./h.p.).

Performance

Although the official performance tests of the "Calcutta" have not yet been carried out, it may be of interest to give the *estimated* performances. The top speed at sea level is 120 m.p.h. (193 km./h.), and the cruising speed 100 m.p.h. (161 km./h.). The landing speed is 57·5 m.p.h. (93 km./h.). Rate of climb at ground level is 800 ft./min. (244 m./min.). The service ceiling is 10,000 ft. (3,050 m.). The "Wing Power" is $\frac{1575}{1825}$ 0·863 h.p. per sq. ft. = 9·26 h.p./m.². As the top speed is 193 km./h., the Everling "High-speed Figure" (metric) is 14, which is an extremely good value for a three-engined flying-boat. The Everling "Distance Figure" at top speed is 4·2, which is also a high value for a machine of this type, As this refers to the top speed, it is not, of course, an optimum value, but as we have no information relating to the power at which the machine cruises most economically, it is not possible to give the maximum value of the "Distance Figure." That it is well above the average seems more than probable.

ROYAL AERO CLUB

A MEETING of the Committee of the Royal Aero Club and the Management Committee of the Society of British Aircraft Constructors was held on February 15, 1928, to consider the question of handicapping formula.

King's Cup.—It was decided that the handicapping should not be on formula but on known performances.

Aerial Derby.—It was decided to hold the Aerial Derby this year on a course round London. Also an Aerial Derby Handicap on formula. The S.B.A.C. put forward a formula which it was agreed to submit to an independent authority for his report.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

Seamen Saved by Aeroplane

THANKS to the aeroplane, 30 of the 39 members of the crew of the Dutch Government vessel *Zeemeeuw*, were rescued when she capsized in a storm off Surabaya, Java. The upturned boat was sighted by an aeroplane.

Spanish Prime Minister's Flight

THE Marques de Estella, the Spanish Prime Minister, flew from Madrid to Seville by air line, on February 9, to inspect, the work on a coming exhibition.

Slotted Wing In Sweden

MR. HANDLEY PAGE lectured before the Swedish Institute of Engineering at Stockholm, on February 8. He described the development of the slotted wing. A machine fitted with slotted wings is at present being tested in Sweden.

New French Submarines

THE new French submarines of the Redoubtable class carry a 3·9-in. anti-aircraft gun and one three-pounder anti-aircraft gun, each.

Aircraft to the Rescue

AEROPLANES have been used to carry supplies and mails during the recent floods in South Australia which followed a prolonged drought.

Model of S.5 at South Kensington

A MODEL of the Supermarine-Napier S.5 seaplane, which won the Schneider Trophy last year, has been presented to the Science Museum at South Kensington. It has been made to a scale of ¾-in. to a foot.

Aerodrome at Brighton

BRIGHTON has a scheme for constructing an aerodrome at Mile Oak, where the Corporation has 1,000 acres. Alderman Carden said at an informal gathering of members of the council on February 16 that it was quite certain there would be enormous developments in flying, and that people ought to be able to fly from Brighton to the Continent.

The Orissa Aerial Survey

ON January 16 last the Air Survey Co., Ltd. completed their coastal survey of Orissa (India) and the expedition returned the following day to Calcutta. The survey, which started on January 11, occupied actually five days, one day being devoted to changing the airscrew, etc. During the five days an area of 300 sq. miles along the coast of Orissa, from Chilka Lake to the Dhemra River was surveyed, and maps are being prepared on a scale of 3 in. to the mile. The primary object of the survey was to assist the Flood Committee to locate the cause, and find a cure, for the incessant floods in this district. The photographs taken show up very clearly a mass of banks lying outside the mouths of the main rivers which no doubt cause considerable obstruction to the flow of water during rainy weather from the plains inland. The expedition comprised S. H. G. Trower (pilot), E. W. Bishop (survey engineer), G. R. Thorne (photographer), R. W. L. Andrews, and J. Durward. The Air Survey Co. are now carrying out an extensive survey in the Mahal district, which will cover about 1,600 sq. miles.

Capt. Malcolm Campbell's Speed Record

THE early endeavours to fly by the Wright brothers were hopeless until motor-car developments solved the problem with the internal-combustion engine. Now aviation engine development has its revenge by enabling automobilism to put up the amazing speed record of 207 m.p.h. by Capt. Malcolm Campbell, on his Napier-Campbell racing car at Daytona Beach, Florida, on February 19. Not only was the engine a Napier racing aero engine, but the body design was determined after a series of wind tunnel tests on models carried out by Mr. R. K. Pierson, Chief Aircraft Designer of Messrs. Vickers-Armstrongs, Ltd. Detachable fins were fitted at the tail to give great directional stability, and these did prevent serious consequences when the car skidded during the record run. Messrs. Barker's, Ltd., the well-known coach builders, built the body. Messrs. Vickers-Armstrongs, Ltd., manufactured the frame, axles, gears, steel forgings in the gear box, crankshaft and connecting rod drop forgings of Vickers steel, and the Fairey Aviation Company designed and constructed the surface radiators fitted between the wheels and body on either side. Special tyres were supplied by Messrs. Dunlops', and amongst the other components were B.T.H. magnetos, Claudel-Hobson carburettors, K.L.G. plugs, Hoffman bearings, Smith's instruments, Ferodo brake and clutch linings, and Triplex glass. Pratt's Ethyl petrol was the fuel used, and Wakefield Castrol oil the lubricant.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-committee of the Fund was held at Iddesleigh House on February 16. Lieut.-Comdr. H. E. Perrin was in the chair, and the other member of the Committee present was Mrs. L. M. K. Pratt-Barlow, O.B.E. The Committee considered in all 10 cases, and made grants to the amount of £82 17*s.* 4*d.* The next meeting was fixed for March 8 at 2.30 p.m.

Royal Air Force Flying Accidents

THE Air Ministry regrets to announce that as the result of an accident near Emsworth, Hants, to a Gamecock machine of No. 43 (Fighter) Squadron, Tangmere, on February 8, Pilot Officer Peter John Basil Chalmers the pilot and sole occupant of the aircraft, was killed.

As the result of a collision in the air at Capel near Folkestone between two Grebe machines of No. 25 (Fighter) Squadron, Hawkinge, on February 17, 1928, Pilot Officer Eric James Watson, the pilot of one of the aircraft, was injured and died later of his injuries. The pilot of the other machine made a safe descent by parachute.

FLIGHT

PRIVATE  FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

FLYING CLUBS OF SOUTH AFRICA

The Port Elizabeth Club

ON January 5 Lady Heath left Cape Town for Port Elizabeth with Major Miller. The first stage to Mossel Bay was covered before breakfast in 2½ hours under ideal conditions. Port Elizabeth was next reached in 2¼ hours, after a flight of 220 miles along the coast. The aerodrome there is conveniently situated close to the town, and is owned by the municipality. There is a very progressive light aeroplane club, and although it was only formed last July with only twenty members it now has over two hundred. It uses a Westland "Widgeon," and has a hangar capable of accommodating three machines. Considerable assistance in its formation was given by Mr. B. Smulian, who was also connected with the establishment and progress of the Johannesburg Club. His method of formation is to obtain donations and issue debentures. Major Miller was also partly responsible, as in similar movements. He flew his D.H. "Moth," and made funds by taking up passengers. Lady Heath says that the "Widgeon," with its high speed and large carrying capacity will be found very useful for the great distances in that country. Sufficient capital is possessed by Port Elizabeth to provide for another machine, but it awaits further development before making this addition. The Club's instructor, Capt. Swann, gives his services voluntarily. He is a very experienced pilot. The ground engineer, Mr. White, also acts in a voluntary capacity. The Mayor of Port Elizabeth is Vice-President, and it is on account of the special local support granted it that the Club keeps the flying charges down to £2 per hour for both dual and solo flying.

On their arrival at the aerodrome the air visitors were met by the Club Committee and the Mayor. Lady Heath's passenger was Mr. C. H. Mayers, who recently motored from the Cape to Nairobi in 23 days. He was given a little instruction in flying, to which he was new, during the flight. A lantern lecture was given in the Town Hall, at which Sir William McIntosh was Chairman, whilst after the lecture Major Miller spoke of the growth of Civil Aviation. The latter's two D.H. "Moths" and Lady Heath's Avro "Avian" were actively engaged at joy-riding on January 7. Port Elizabeth is a very windy place, and the use of goggles was found convenient when on the ground to protect the eyes from the flying sand. The charges per flight were £1. The Club members worked hard at catching the machines as they landed. Lady Heath found that the broad undercarriage of her "Avian" made landing even in those conditions very safe and easy. The machine gave no suggestion of tipping over.

The Westland "Widgeon" was formally presented to the club by the Mayor one afternoon and the instructor gave flights to many passengers. Then followed a race of ten miles over a triangular course, the two "Moths" starting together, the "Avian" following after ten seconds and the "Widgeon" thirty seconds later. Flying low in the high wind made things rather uncomfortable. The "Avian" won by a small margin from Major Miller's "Moth," and the "Widgeon," flown by the instructor, fought a neck-to-neck race for third place with the other "Moth." An exhibition of stunting was then given by Major Miller and the rest of the afternoon was devoted to joy-riding.

There are a number of ex-war pilots in Port Elizabeth who have become very keen on flying again and it is rumoured that a number of orders for private aeroplanes will be lodged shortly. There are many lady members and it will probably not be long before the Club produces one or two as pilots. Local disappointment is felt because the Royal Air Force machines, which are making their Service flight to the Cape in March, are not scheduled to land at Port Elizabeth. Efforts are being made to have them do so.

The Tour Continues

The visitors left Port Elizabeth for East London after their visit with the intention of landing at Port Alfred, 120 miles away, to pick up Mr. Lomax, who had been giving joy-rides there in Major Miller's D.H. "Moth." They were told that the aerodrome was about three miles outside the town, but it could not be located. It was learned afterwards that the Mayor waited to give them a civic welcome and the native

With the South African Clubs: Lady Heath performing the christening ceremony of the Port Elizabeth Club's machine, the Westland "Widgeon." It was christened "The Lady Heath." The Lord Mayor of the town is seen third from the left.

chief from the neighbouring hills had assembled his warriors for a dance and intended to present them with his own assegai.

East London was eventually reached after a 3 hrs. 10 mins. flight against a strong head wind. All the surrounding country has been afflicted with a drought for the past three years, and in some places the few remaining sheep were selling at 1s. each. The many rivers along the coast are tidal and long high sand banks at their mouths revealed the waterless state of the country. Conditions are so bad in some areas that three trains carrying water are sent up from East London and Port Elizabeth every day.

East London appeared to be considerably larger and more spread out than Port Elizabeth. There was difficulty in finding the aerodrome as the maps used only showed a circle on the towns possessing aerodromes. A survey of the aerodrome before landing revealed a rough surface except for a small space and several attempts to land were made before settling down, also on account of the high wind. Bathing at this place is particularly good and the surfing along the coast is supposed to be much better than that at Honolulu.

A D.H. "Moth" was delivered in November, 1927. There were then 100 members, 20 of whom were flying members. Mr. Harrison and Mr. Kurtz became voluntary instructors. The aerodrome belongs to the municipality, who lend it free of charge. A small sloping hangar has been constructed with packing cases given by several motor companies. The town council has started cutting down the bush to enlarge the aerodrome, which is small and sloping, with portions very rough. When this work is finished the ground will be 1,000 by 1,500 yards. The club fixed its charges for commercial work at £4 per hour and 10s. per hour waiting time. The instruction fee for members is 10s. per 15 mins., which is the maximum rate for preliminary instruction. Solo flights cost £1 per 15 mins. It was the first club to register a machine.

Off to Durban

On January 13 the visitors left for Durban. They started in formation, Lady Heath flying her "Avian," Mr. Lomax a "Moth," and Capt. Swann the "Widgeon." In the early morning the visibility was exceptional. Impassable looking mountains were crossed and when over the border of Kaffirland hundreds of tiny huts, each with small cultivated patches, were noticed on the side of the mountains. It is the mountains which are the best guide for navigation, as the best available Ordnance Survey maps were made in 1923 and are not correct about the present roads, and they do not give the heights, although they show the slopes of the mountains well.

Towns in this particular country appear about the size of Wantage or Bideford and mostly nestle in the lee of a high hill. Usually they are without railways, so that as the roads are mere dirt tracks they are often hard to locate. After two hours' flying from Durban they flew over Umtata, which lies in a bowl in the foothills of the Drakensverg. It was almost hidden by clouds. The D.H. "Moth" landed in a field after the formation had continued flying until spotting clear land again and finding a small town. On flying low Lady Heath saw that this field was dotted with ant-heaps, so she searched again and landed on a smooth road. The town proved to be Tsolo. All the inhabitants turned out to welcome the visitors, a few white people arriving in cars and many natives on horseback. To re-fuel was expensive there because the town's supply had to be conveyed 100 miles in ox-waggons. On taking-off the tourists went back to Umtata and landed there.

The "Avian" next left Umtata alone and flew to Durban.

The Port Elizabeth Club: On the left of Lady Heath is Major Miller, who is prominently associated with civil aviation in South Africa, and has helped in the formation of the clubs by flying his own D.H. "Moth," and raising funds. On the right is the Lord Mayor of Port Elizabeth, then comes Capt. Swann, the Club's instructor, and finally, Mr. Hurch, President of the Club. In the background is the nose of the Westland "Widgeon."

Much joy-riding was done there, and the Westland "Widgeon" and D.H. "Moth" arrived from Port Elizabeth and Port Alfred respectively.

The East London Club

The town's light aeroplane club was formed in an interesting way. In 1926 the Swiss pilot, M. Mittelholzer, visited the town during his great flight to South Africa from Switzerland. He found there were no suitable arrangements made for his reception, so the town decided to remedy this in the future. It formed a social club, the members of which were ex-pilots and influential residents. The leading organisers were Mr. Carrington and Mr. Harrison. In June, 1927, representatives were sent to the Aero Club conference at Johannesburg, from which the Aero Club of South Africa grew. It was then decided to establish an active flying club. Major Miller gave his usual valuable help, obtaining donations from various firms, giving flights at £1 each and longer ones at £6 each. About £400 was raised and the rest of the capital was obtained from private donations by members and non-members. Although sufficient money was received to purchase a machine such a big outlay was not thought advisable immediately. However, through the generosity of Mr. H. Barnes of Messrs. Malcomess, Ltd., and Mr. W. J. Ellender, president of the club, an extra £200 was raised. Thus the machine and a surplus became possible.

◈ ◈

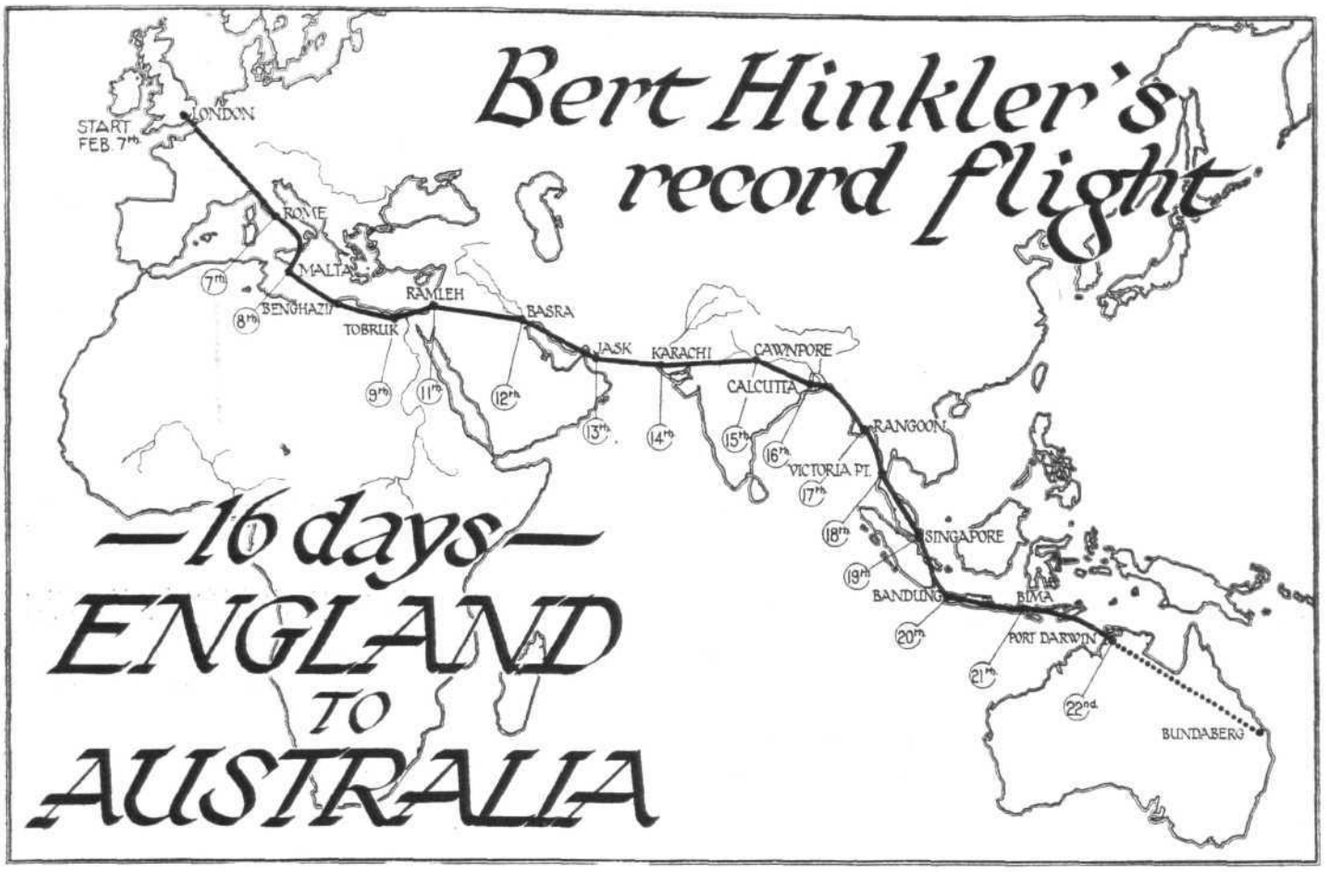
Story of the "Cirrus"

IN a most attractive illustrated booklet the interesting story of the "Cirrus" engine has been told and published by its manufacturers, the A.D.C. Aircraft, Ltd., Regent House, 89, Kingsway, W.C.2. One learns from this the pioneer part played by the engine in the commencement and development of private flying, its wide adoption today, and the great flights in which it functioned so successfully.

◈ ◈

"Cirrus" engines have flown over 1¼ million miles, and are used by flying clubs in England, Australia, Canada, and South Africa. They have also been supplied to the Air Ministry, Royal Australian Air Force, Canadian Government, Irish Free State Air Force, and in twelve different countries. "Bert" Hinkler's London–Australia flight is the latest addition to a big list of flying records in which the "Cirrus" has "assisted."

FLIGHT



SIXTEEN days after leaving England, Mr. " Bert " Hinkler landed his Avro " Avian " (Cirrus) light aeroplane at Port Darwin at 6 a.m. on Wednesday, February 22. It is characteristic of him that the faith he instils is usually justified. From the start, the flight compelled widespread attention. The non-stop flight from London to Rome, on February 7, a distance of 1,100 miles, was indicative of the seriousness of the project and the progress to come. With a wonderful regularity, long stages were flown day after day, until it became almost certain that success would be achieved. The extraordinary physical powers of the pilot, and the great response of the machine under the gruelling test attracted constant admiration. The progress seemed incredible at times.

After the Rome stage, on February 7, he flew to Malta direct, in six hours, in which 400 miles were covered and the landing made at 3 p.m. Then came the sea crossing to Benghazi on the following day by 1 p.m., and a resumption of the journey along the North African coast to Tobruk in the afternoon, where the night was spent. This meant that in three days the Continent of Africa had been reached from England. Next day, February 11, he flew from Tobruk to Ramleh, in Palestine, and on February 12, from Ramleh to Basra, a non-stop flight of 9½ hrs., in which 950 miles were covered, the best performance accomplished since the Rome stage. He commenced it with the intention of landing at Baghdad, but it was apparently realised that the longer distance could be bridged. By such decisions was the progress of this journey so greatly accelerated. It was Sunday evening when the Avro " Avian " got to Basra.

On the Monday morning, February 13, Jask was reached by noon, which completed the day's work; but the following morning, after a flight in beautiful weather down the Persian Gulf, Karachi was gained, seven days after leaving England. This was a significant and record achievement for the journey between the two countries. It meant that about 5,000 miles had been flown in seven days at an average of over 650 miles per day. A fast liner and express trains enable the distance to be travelled in 19 days. India was able to read English newspapers only a week old. It was reported that the running expenses so far for this air trip were only £20.

Bert Hinkler.

The only defect experienced up to that time was a slight leak in the oil tank, on the way down the Persian Gulf, which was quickly repaired by R.A.F. mechanics and caused no delay.

With the journey nearly half completed, Mr. " Bert " Hinkler did not take advantage of any respite. He pushed on day by day, as quickly as possible, and got across India in two days, with two hops. The first was from Karachi to Cawnpore, on February 15, a distance of 850 miles, and the second, on February 16, was from Cawnpore to Calcutta, a distance of 650 miles.

There he met the German pilot, Herr Konnecke, who is making a flight to Japan, and has been delayed in India for some months, after starting from Europe with a most promising non-stop flight. On the next stage, to Rangoon, the " Avian " cut across the bay to Akyab, passed over the Yomas at an altitude of 7,500 ft., encountered two storms and heavy rain. After Rangoon came a 500-mile trip to Victoria Point, Burma, on February 18, and then another great hop of nine hours the next day, to cover the stretch to Singapore. Thus 7,900 miles from England to Singapore had been bridged in 13 days. After passing Penang on this last stage, several heavy rainstorms were met and just before reaching Singapore, it was necessary to make a wide detour to miss a thick storm belt.

Mr. " Bert " Hinkler met Capt. Lancaster at Singapore where the latter is held up whilst his Avro " Avian " is being repaired. Our readers will remember that he is trying to reach Australia with his passenger, Mrs. Keith Miller. A message home from Capt. Lancaster stated that Mr. Hinkler

said that his "'Cirrus' engine looked and ran as though it had just come off the test bench in spite of its gruelling test."

On February 20, Bandung, in Java, was reached from Singapore, then a hop over 900 miles the next day brought the "Avian" to Bima, On the final stage, from Bima to Port Darwin, he flew 1,000 miles, 600 of which were over open sea.

Mr. "Bert" Hinkler has been the first to reach Australia by light aeroplane and he beat the time taken by Sir Ross Smith and Sir Arthur Smith in 1919 by 12 days. Other achievements incidentally accomplished are: the longest solo flight and the longest flight in a light aeroplane. He did not quite beat his own unofficial record for the longest non-stop light aeroplane flight which was 1,200 miles, the distance covered on his London-Latvia trip last year. The propeller on his Avro "Avian" is a Fairey.

The Time Table of the England—Australia Flight is as follows:—

Feb-		Feb.	
7	London—Rome. (1100)*.	16	Cawnpore—Calcutta. (650).
8	Rome—Malta. (400).	17	Calcutta—Rangoon. (650).
9	Malta—Benghazi—Tobruk. (980).	18	Rangoon—Victoria Point. (500).
11	Tobruk—Ramleh. (350).	19	Victoria Point—Singapore. (720).
12	Ramleh—Basra. (900).	20	Singapore—Bandung. (625).
13	Basra—Jask. (800).	21	Bandung—Bima. (900).
14	Jask—Karachi. (580).	22	Bima—Port Darwin. (1000).
15	Karachi—Cawnpore. (850).		

* Approximate mileage.

LIGHT 'PLANE CLUBS

LONDON AEROPLANE CLUB

REPORT for week ending February 19:—Flying time: Dual instruction, 17 hrs. 50 mins.; solo flying, 12 hrs. 40 mins.

Dual Instruction.—With Capt. F. G. M. Sparks: W. H. Lane, Major Mason, C. E. Murrell, W. L. M. O'Connor, R. Hayes, Miss Fletcher, E. A. Lingard, G. Black. With Capt. S. L. F. St. Barbe: G. Black, S. Hansel, Miss H. Cholmondeley, C. Peckham, J. P. Edinger, A. P. Glenny, P. W. Hoare, A. O. Wigzell, Mrs. Fraser, Miss Fletcher, L. Rowson.

Solo Flying.—J. J. Hofer, R. Sanders Clark, Sqdn.-Ldr. M. E. A. Wright, W. L. M. O'Connor, P. W. Hoare, G. W. Hall, B. B. Tucker, Major H. Petre, H. B. Michelmore, E. E. Stammers, O. J. Tapper, C. E. Murrell, W. Hay, M. L. Bramson, W. L. Ballantyne, H. Solomon, H. M. Samuelson, Rich. Hayes, E. A. Lingard.

Passenger Flights.—With Capt. S. L. F. St. Barbe): Miss H. Cholmondeley, Miss V. Cholmondeley, N. F. Shelley. With Capt. F. G. M. Sparks: H. Sutton, D. Robertson, Mrs. D. Black, Miss Walton. With E. E. Stammers: Miss Maddock, Miss Stammers. With O. J. Tapper: R. C. Richmond, Miss H. Cholmondeley. With Sqdn.-Ldr. M. E. A. Wright: G. W. Hall, With Major H. Petre: Mrs. Fraser. With W. Hay: Mrs. Davis. With W. T. W. Ballantyne: Miss Fowkes.

The improved weather conditions of Saturday and Sunday resulted in considerable activity at the club during the week-end, and we were able to get in 26 hours flying on the two days.

W. L. M. O'Connor and E. A. Lingard flew solo for the first time, and H. M. Samuelson passed the necessary tests for his Pilot's Licence.

Members' Meeting.—The attendance of members at the General Meeting on the 15th instant, was very satisfactory, and the suggestion that such Meetings should be held at more frequent intervals met with the unanimous approval of the Members present and the Committee of the Club. It was purely an informal gathering and Members were given every opportunity of putting forward their views as to the future policy of the Club.

Members took full advantage of this opportunity, and many valuable suggestions were submitted for the consideration of the Committee.

It was pointed out that the Committee had, under review, certain proposals for extending the activities of the club, and that these proposals would be submitted to the Members at a later date.

BRISTOL & WESSEX AEROPLANE CLUB

REPORT for week ending February 18:—Total flying time, 14 hrs. 35 mins. Instruction, 4 hrs. 45 mins.; solo, 9 hrs. 15 mins.; passengers, 35 mins.

Under instruction: Major Hume, Messrs. Arnold, Inskip, Bryan, Roberts, T. H. Clarke, and B. L. Bathurst.

Soloists: Messrs. Downes-Shaw, Arnold, Jopp, Roberts, T. H. Clarke, Hall, and H. C. H. Bathurst.

Passengers with Mr. E. Hopper: Mr. Rowbottom. With Mr. S. K. Jopp: Miss Van Sommer.

Flying was possible only for part of Sunday and all Saturday. The weather from Monday to Friday is best described in words which, though terse and expressive, have not, as yet, been adopted in the official reports of the Meteorological Office.

Preliminary work in preparation for the Air Pageant, to be held here on May 5, is well advanced.

HAMPSHIRE AEROPLANE CLUB

REPORT for week ending February 19.—Flying time, 17 hrs. Instruction 7 hrs. 55 mins. Solo flights, 6 hrs. 35 mins. Passenger flights, 1 h. 50 mins Tests, 40 mins.

Instruction with Flight.-Lieut. F. A. Swoffer:—Mrs. Ranald, Cierva, Cooper, Kerry, Watson-Taylor, Southcliffe, Baynes, Perfect, Lowe-Wilde, Shepherd, Richardson, Puttock, Bull, Heath, Cripps, Kirby, Courtney, Mandeville, Scott-Hall, Curtis-Nuthall, Dickson, Grosvenor.

Soloists.—Cierva, Cooper, Kirby, Lowe-Wilde, Shepherd, Cripps, Southey, Flight-Lieut. Crawford, Fagan, Bowen, Wells, Parker, Oliver, Heath.

Passengers:—With Mr. Oliver: Miss Anderson. With Flight-Lieut. Crawford: Miss Grace, Miss Hancock-Steil. With Mr. Bowen: Mrs. Waterman. With Flight-Lieut. Swoffer: Miss Marriot.

Flying was only possible Tuesday, Saturday and Sunday. We have now two machines and hope to have a third next week, as Flight-Lieut. Swoffer is collecting a Moth from Stag Lane on Monday.

LANCASHIRE AERO CLUB

REPORT for week ending February 18.—Flying time, 22 hrs. 10 mins Instruction, 8 hrs. 55 mins. Solo flights, 7 hrs. 45 mins. Passenger, 4 hrs 30 mins. Tests, 1 hr.

Instruction. with Mr. Baker: Cohen, Tweedale, Hall, Benson, Harber, Brooking, Goss, Davison, Crosthwaite, Michelson, Gort, Ward, Secker, Fallon, Weale, Hardy, Stern, Meads.

With Mr. Cantrill: Miss Baerlein, Gort, Michelson.

Solists (under instruction): Cohen, Browning, Gort, Hall.

Pilots: Nelson, Michelson, Meads, Davison, Crosthwaite, Twemlow, Ward, Hardy, Caldecott.

Passengers.—With Mr. Baker: Harrison, Sweeney, Leach. With Mr. Twemlow: Hall, Miss Jump, Mrs. Mortimer, Mrs. Twemlow. With Mr. Cantrill: Mrs. Brimelow, Dr. and Mrs. Stross., Mrs. Bishop, Miss Busby, Faulkner. With Mr. Goodfellow: Mr. Hall. With Mr. Lacayo: Mills, Whitehouse, Rennison, Browning.

The air was thick with fog-fumes and aerofoils this week-end, all the machines being serviceable together for the first time this year. Mr. Caldecott obtained his "A" licence and Messrs. Cohen, Gort and Hall accomplished excellent first solo flights.

Unfortunately, Mr. Anderson, one of our private owners, met with misfortune on the Saturday. While flying L. V. cross-country with Mr. Lacayo, they were caught by a strong down-current and compelled to land on a hill-side. The machine turned over, but neither of the occupants was injured.

MIDLAND AERO CLUB LIMITED

Report for week ending February 18.—Total flying time, 13 hrs. 22 mins

Dual instruction with Mr. McDonough: E. P. Lane, E. Wynn, C. W. Fellowes, H. Lattey, G. Aldridge, G. Robson, S. Hall.

Solo: W. Swann, R. L. Brinton, R. L. Jackson, G. Brinton, C. Fellowes, H. J. Willis, S. H. Smith, E. J. Brighton.

Passengers with Mr. Brighton: G. Buckle, A. Ackling. With Mr. Jackson: L. V. Mann, S. H. Smith, E. Wynn.

Capt. McDonough, who has been the Chief Instructor since the Club commenced operations as one of the Approved Light Aeroplane Clubs, is leaving us at the end of the month to take up an appointment in Canada. His successor will be Flight-Lieut. T. Rose, D.F.C., R.A.F.O.

NEWCASTLE-UPON-TYNE AERO CLUB

REPORT for week ending February 19.—Total flying, 16 hrs. 55 mins. Instruction, 6 hrs. 30 mins. "A" Pilot, 8 hrs. Passengers, 1 hr. Tests, 40 mins. Solo training, 45 mins.

The following flew under instruction with Mr. Parkinson:

Messrs. Percy, V. Heaton, Brown, Runciman, Griffiths, Horn. Advanced dual: Mr. DePledge.

"A" Pilots: *Dr. Dixon*, Mr. D. *Wilson*, Mrs. Heslop, Mr. C. *Thompson*, Mr. H. Ellis, Mr. J. D. Irving, Mr. R. N. Thompson, Mr. Turnbull, Mr. Mathews, Mr. L. C. Davey, Mr. A. Bell.

Soloists: Mr. DePledge, Mr. N. Horn.

Passengers with Mrs. Heslop: Mr. Luckman, Mr. C. Thompson. With Mr. C. Thompson: Mrs. Heslop, Mr. Bulmer, Mr. Luckman, Mr. J. Todd, Mr. O. Robson, Mrs. White; with Mr. H Ellis: Mr. Meehan; with Mr. R. N. Thompson; Mrs. Rutherford: with *Dr. Dixon*: Miss Dixon: with Mr. A. Bell: Miss Bulmer, Mr. Heath, Mr. J. Bell: with Mr. J. D. Parkinson: Dr. Grensell, Mr. W. White, Mr. Hayton.

Flying was possible only for a short time on Tuesday and Thursday, but Sunday proved quite good and of the week's total 14 hrs. 30 mins. was completed on that day.

Mr. Horn carried out his first solo flight in excellent style on that day, the first it has been possible to launch a pupil this year.

The club's fleet of three Moths was never idle throughout the day, except during the lunch hour.

On Sunday next, the 26th, the Forced Landing Competition, for the Cup presented by Mrs. J. D. Irving, takes place at 3 p.m., and it appears that this will be an interesting contest, as all the regular flying pilots have entered. The competition is confined to *ab initio* pilots and will be won outright.

There will be no danger to the Moths, as Mr. Parkinson will occupy the passenger's seat. There has not been any applications for his post, which *certainly should be interesting*, at least.

NORFOLK & NORWICH AERO CLUB

FLYING report for week ending February 19.—Total flying time, 6 hrs. 15 mins.

Instruction with Capt. Lines: Messrs. G. Watson Parker, G. Barker, N Brett, N. Lindley, C. Gowing.

Soloists: Messrs. R. Moore, F. Gough.

Passengers: Miss Speechley, Messrs. Alexander, P. Townshend, H. Green.

Another week of bad windy wet weather has kept our flying time down to a minimum and very little indeed has been possible except on Saturday and Sunday. Sunday, of course, was an ideal day and a large gathering of members and friends were present at the aerodrome.

A visiting Westland Widgeon was very much enjoyed, practically all the soloists trying her out.

The Club House was looking very attractive yesterday through the splendid gifts of table cloths by Mrs. H. J. Cator and crockery by Mrs. Pillow and Miss Rice. These were badly needed and it is here where the feminine touch is so helpful.

In connection with a lecture on aviation four of the Paston Grammar School boys from North Walsham were given "joy rides" on Saturday morning.

SUFFOLK AEROPLANE CLUB

REPORT for week ending February 19.—Flying time, 10 hrs. 30 mins

Instruction with Mr. Lowdell: Miss Rhodes, Miss Creasy, Miss Edwards' Messrs. H. Billinton, K. Peck, R. Brown, F. Jolly, G. Smith.

Passengers with Mr. Lowdell: Mrs. Courtney Prentice, Mr. C. Hanson, Miss Heckmonthwait, Miss Lowdell, Mr. Chadwick, Mr. Brittain, Mrs. Wardel, Miss Birch; with Mr. Prentice: Mrs. Taylor, Miss Thompson, Mr. E. Croydon.

Soloists: Dr. Jas. Sleigh, S. Schofield, C. N. Prentice.

Mr. Lowdell, who has devoted all his spare time for the past four months as the club's voluntary instructor, has now secured his release from the Royal Air Force and has been engaged by the club as chief instructor. The aerodrome will from now onwards be open for instruction every day except Fridays. Members please note.

On Sunday Flight-Lieut. Comper, of the Felixstowe Light Aeroplane Club, flew over in their C.L.A.4 and gave joy-rides to several of their members.

Sunday was a perfect day and we managed to get in six hours' flying.

FLIGHT
AIRCRAFT ENGINEER

AIRISMS FROM THE FOUR WINDS

African Survey Flight

SIR ALAN COBHAM carried out his special contract for a return flight between Lake Victoria and Khartum with great success. It was carried out at the request of the East African Governments and Colonial Office, in order to complete the undertaking of the Blackburn Aeroplane Co. in connection with the formation of a permanent service. From Entebbe to Khartum and back was flown in four days, covering a distance of 2,700 miles. The longest stage of 820 miles, from Khartum to Mongalla, was completed in 8 hrs. 40 mins. Sir Alan Cobham is now at Nairobi, and attended a conference at which the establishment of an East-African air service was discussed. Sir Edward Grigg (Governor of Kenya), Sir W. F. Gowers (Governor of Uganda), and Sir George Schuster (representing the Sudan) were also present. Finance is the chief difficulty, but it is reported that a satisfactory basis of agreement has been reached. Sir Alan Cobham expressed the opinion that in a year after the completion of negotiations the Alexandria-Kenya section of the air route from Cairo to the Cape would be opened, but the whole route would not be running for three years yet. On February 19, Sir Alan attended the Colony's first flying meeting, at which four privately-owned machines competed.

The D.H.9 Tour

FLYING Officers J. S. Newall and N. Vintcent, who left London on a flight to the East on January 9 in two D.H.9 machines, arrived at Cairo on February 17. They were caught in a violent sandstorm in the desert on February 16, forced to descend, and wait for three hours until it cleared.

Great Flying Boat Cruise

THE four R.A.F. Supermarine "Southampton" flying boats reached Penang from Mergui, Burma, on February 16 having flown the distance of 500 miles in seven hours. They are remaining at Penang for a week.

Flight to the North Pole

ON February 13, Capt. G. Wilkins and his pilot, Lieut. Eileson, left Seattle to prepare for another attempt by air upon the North Pole. This will be his third effort. In the early spring they hope to fly from Point Barrow, Alaska, to Spitsbergen. He has taken a new aeroplane with him, and sufficient supplies for six months.

New York-Bucharest Attempt

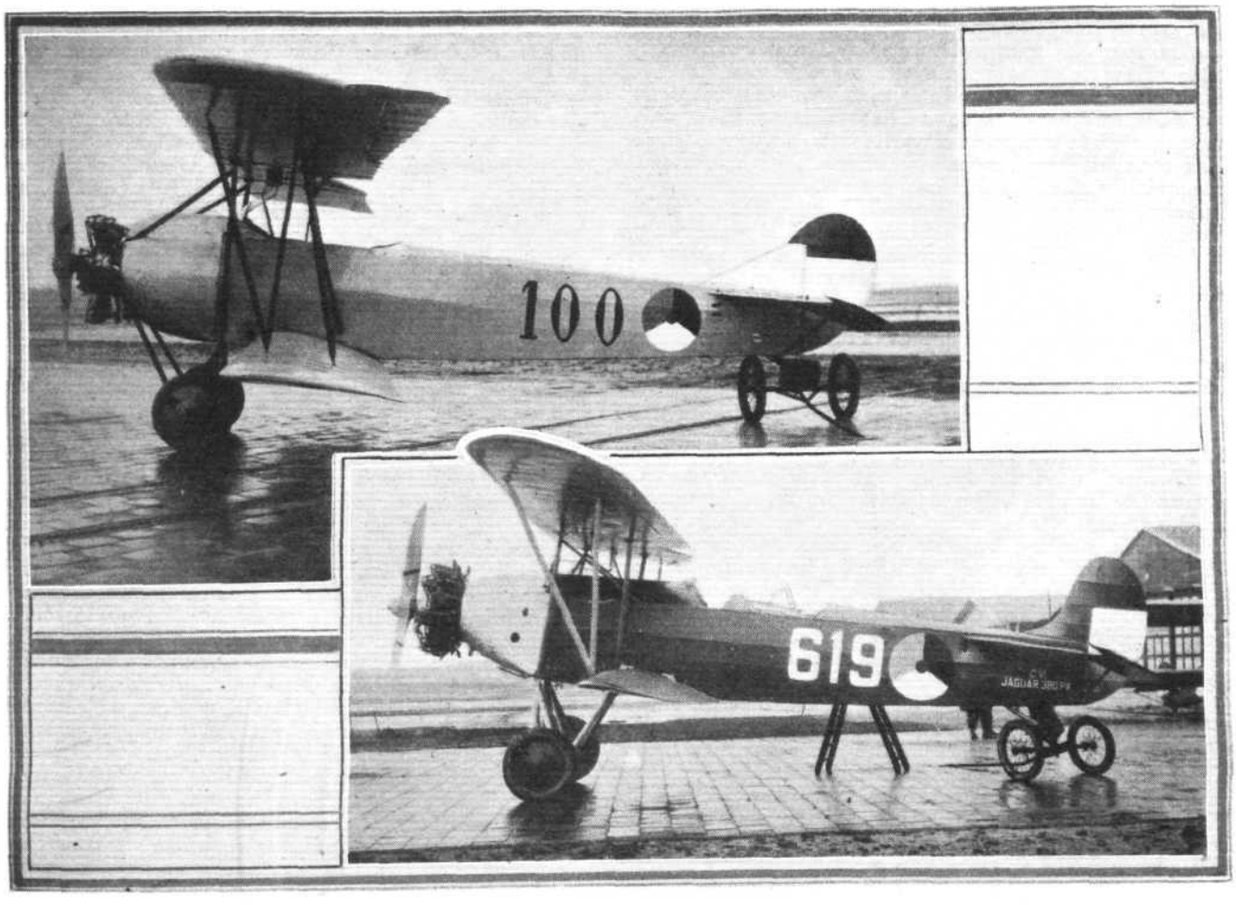
LIEUT. G. FERNICO, a former officer of the Roumanian Flying Corps, is proposing to fly from New York to Bucharest, and is now engaged in constructing a special machine for the purpose.

Ice Dam Bombed

ICE dams on the Vistula in Poland were bombed by a squadron of aeroplanes recently after the river awoke from its winter sleep.

Lindbergh Will Fly

COL. LINDBERGH will not listen to the appeals being launched in America requesting him to give up flying, and a promise was made by Mr. Davis, Secretary for War, to use his influence. The agitation was provoked by his long flight to St. Louis from Havana at the end of his recent "goodwill tour" in South America, in the course of which he became two hours overdue owing to very bad weather prevailing.



THE ARMSTRONG-SIDDELEY ABROAD: *Two successful Fokker-Armstrong Siddeley combinations.* **Above is the Fokker Training biplane, which is fitted with the 150 h.p. "Mongoose" engine. Below is the C.VI reconnaissance machine, which is fitted with the 385 h.p. "Jaguar."**

R.A.F. in Action

ON February 20, a force of 600 Wahabi camelry was reported to be moving across the desert, 80 miles south-west of Basra, and R.A.F. machines went out to reconnoitre. The Wahabi outlaw, Sheikh Feisal el Dowish, has given a lot of trouble on the Iraq frontier, and was reported to be approaching Kowejt, in Arabia, at the head of his force. H.M. cruiser *Emerald* has anchored in Kowejt Bay.

Mrs. Carbery in East Africa

MRS. CARBERY returned to East Africa from England early this year, taking with her the D.H. " Moth " she bought. It was assembled at Mombasa and she made a non-stop flight of 3½ hours to Nairobi recently with a member of the Legislature as passenger.

Victim of " Dole " Derby Found ?

THE body of a naval officer was washed up off Ventura, California, on February 17, and is thought to be that of Lieut. Knope, who was lost with Miss Doran and Mr. J. Pedlar when attempting to fly from Oakland to Honolulu last August for the " Dole " prize.

Missing

AN aeroplane operating with the Hudson Straits Expedition has been reported missing for some days. Flying Officer A. Lewis is the pilot, and with him are Flight Sergeant Terry and an Eskimo. It left the base at Burwell on February 17 and four hours later the pilot sent a wireless message saying that he had lost his bearings and was landing on the ice. Three aeroplanes have been searching the icefields and dog teams patrolling the shore line.

Blown up in Mid-Air

WHILST dropping bombs to advertise a proposed " Air Derby " in the South-Eastern States of America, two airmen, Mr. S. Steele and Mr. F. Ashcraft, were killed by a premature explosion in mid-air. They were pilot and mechanic respectively to the Towanda Aircraft Corporation. The machine fell 2,500 ft. in a street in the business quarter of Macon, Georgia.

Sir Alfred Mond Leaves Baghdad

ON February 15, Sir Alfred Mond left Baghdad by air.

Twenty Years Ago !

Extract from "The Auto" (Precursor of "Flight"), Feb. 22, 1908.

"*Larger Airship for the French Army.*—The French Minister of War has appointed a Commission to study the problem of the possibilities of a new French military dirigible of a much larger and more powerful type than the " Patrie." Messrs. Lebaudy have prepared drawings which are already before the Commission, and these include a design for an airship of 100 metres in length, 11·5 metres in diameter, and having a capacity of 7,000 to 8,000 cub. metres. It is proposed that the envelope be made of waterproof material like that of the " Patrie " but supported by an internal framework sufficiently strong to enable the gas-vessel to maintain its form under all conditions. An auxiliary balloonette inside the main vessel would be used to compensate for expansion and contraction of the gas."

SIR PHILIP SASSOON AT OXFORD

Address to the Oxford University Conservative Association

ON February 10 Sir Philip Sassoon, Under Secretary of State for Air, gave an address to members of the Oxford University Conservative Association, and we give below a brief *résumé* of his speech.

Having, in his opening remarks, referred to the coming to England of the original Wright biplane and to A. V. Roe's early efforts, as examples of the rapid progress made in aeronautics, Sir Philip proceeded to discuss the present position of aviation. At the end of the war, he said, Great Britain had the most powerful Air Force in existence; today we were content to have what we believed to be the most efficient air force in the world, which we hoped was, for the moment, sufficient for our needs. We had adopted as the guiding principles of our military air policy a sort of half-way house between the principles by which the size of our Navy was controlled, and those which governed the size of our Army. We had accepted as a guide to the size of our Air Forces such a strength as shall be sufficient to make the strongest air power within striking distance of our shores hesitate to attack us.

They had then, he continued, followed in the system of organisation the plan of the Army, endeavouring to provide behind a highly-efficient professional force a territorial organisation which, when need arose, would enable our national air strengths to be rapidly expanded. He was glad to see that greater opportunities for learning to fly were now being given to this University, and he had little doubt but that they would take full advantage of the facilities given them.

Touching upon the problems presented by war in the air, Sir Philip said that it was shown in the recent air manœuvres in the London district that it was practically impossible, even with superior forces, to intercept, destroy or turn back the whole of a reasonably numerous and really determined raiding force of aeroplanes. It was shown, too, during the war, that even a comparatively small amount of bomb-dropping in a crowded city exercised a serious effect upon the *morale* of the civilian population. It was, therefore, all the more important to build up an organisation in peace which will make it possible, in the event of war, to develop our air forces as rapidly as possible.

In the next war, he thought, air attack would not be relied upon to bring victory, but would be followed, perhaps accompanied, by an attempt at invasion by ground forces. England's security had been greatly modified by the advent of air power; she was still an island, militarily as well as geographically, and the solution of the problem called for a proper adjustment between the requirements of the three factors involved—naval, military and air.

" I do not think," said Sir Philip, " that anyone in this country would now wish to revert to the old arrangement under which their air forces formed part of the Army and the Navy. With no one specially responsible for the development of air strategy or the control and direction of air investigation and supply. In the United States, and in the case of other Continental nations, different military considerations apply; but even in the United States during my recent visit there, I was able to remark certain definite disadvantages arising from their dual system of control and organisation which here we have happily avoided by the establishment of an independent Air Ministry and Air Force. I noticed in one case that the Army had turned down as unsuitable a machine which the United States Navy was ordering in large numbers for the same sort of work."

In order, he proceeded, to build up adequate civilian reserves behind our professional air force civilian flying had got to be made a commercial success. There were two branches of civilian flying—the amateur sporting side, and the industrial money-making side. Both, however, depended for their success upon a factor which military flying in the past had often had to neglect, and would probably always have to neglect in some degree, the factor of safety. Sir Philip then referred to the Handley Page automatic slot.

The growth of the flying clubs throughout the country during the past year or so had, he pointed out, been most encouraging, and fully justified the money which the Air Ministry had devoted to assisting them. By these means a reserve of competent pilots was being formed among the very best type of the population for the purpose.

Regarding Empire commercial flying, Sir Philip said this demanded something more than the aeroplane. It called for the flying boat, and probably the airship. In flying boats, quite properly, we led the world, and for inter-Empire air travel, the flying boat introduced a new factor of safety from which much might be hoped. Flying boats of the future, he suggested, would probably be able, in the event of a forced descent in high seas, to discard their wings altogether and ride out the storm, as a powerful, well-designed motor lifeboat. Then he did not think crossing ocean spaces by air would be little or at all more dangerous than crossing by liner.

" I do not," concluded Sir Philip, " need to dilate at this hour and to an audience such as this upon the immense advantages to the political and economic development of the British Empire which flow from the establishment of an adequate system of inter-Empire air communications. The time for that development is not yet with us, but it is coming and coming soon; provided only that we maintain a government in power which has the vision to realise the possibilties which lie so close before us."

FLIGHT

THE ROYAL AIR FORCE

London Gazette, February 14, 1928.

General Duties Branch

The following Pilot Officers are promoted to rank of Flying Officer :—N. R. Buckle (Aug. 8, 1927) ; R. H. C. Taylor (Nov. 8, 1927) ; E. D. Turner (Nov. 8, 1927) ; E. L. Burslem (Nov. 10, 1927) ; J. R. Whitley (Jan. 17) ; C. R. McEvoy (Feb. 4). The following Pilot Officers on probation are confirmed in rank :—G. J. Powell, T. H. Downes, J. F. Moir, L. T. Carruthers, R. S. Munday, D. L. Maclean (Sept. 1, 1927) ; J. D. F. Bruce, W. G. H. Ewing, R. J. P. Morris, H. A. G. Comerford, G. A. G. Johnston (Jan. 15).

The follg. are placed on half-pay list, scale B :—Flight-Lieut. F. L. Luxmoore, D.F.C. (Feb. 3) ; Flight-Lieut. C. McL. Vincent, D.F.C. (Feb. 11 to 13 inclusive) ; Flying Officer L. H. Anness (Feb. 9).

Pilot Officer P. H. Jackson is placed on retired list on account of ill-health (Feb. 15). The following are placed on retired list at their own request :—Flight-Lieut. N. M. S. Russell (Feb. 8) ; Flying Officer L. R. Staddon (Feb. 13).

Flying Officer E. C. A. Wing is transferred to Reserve, Class A (Feb. 4).

Stores Branch

Squadron Leader J. S. Goggin is placed on retired list (Feb. 14).

Medical Branch

The following Flight-Lieuts. are granted permanent commns. in rank stated (Feb. 15) :—E. Thompson, N. I. Smith, M.D. The follg. are granted short-service commns. in rank of Flying Officer for three years on Active List, with effect from and with seniority of Feb. 2 :—J. Kemp, M.B., B. B. Kennedy, M.B., J. J. MacAndrews, M.B., R. F. MacLatchy, M.D., J. B. Murphy, M.B., J. C. Neely, B. A., F.A. O'Connor, M.B., L. O'Connor, M.B., J. J. Quinlan, M.B.

Memoranda

The permission granted to Sec.-Lieut. A. C. Dutton, D.F.C., to retain rank is withdrawn on his enlistment in the Territorial Army (Dec. 5, 1927). The permission granted to Sec. Lieut. A. Gaze to retain rank is withdrawn on his conviction by the Civil Power (Jan. 6).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

Pilot Officer A. G. Store is promoted to rank of Flying Officer (Feb. 9). The following officers on probation are confirmed in rank :—Flying Officer W. A. Ramsay (Feb. 13) ; Pilot Officer W. A. E. Featherstone (Feb. 9).

The follg. are transferred from Class A to Class C :—Flight-Lieut. A. W. Clemson, O.B.E., D.S.C. (Feb. 14) ; Flying Officer M. R. Banks (Feb. 5). Flying Officer R. E. Watson is transferred from Class AA to Class C (Feb. 11).

The following relinquish their commns. on completion of service :—Flight-Lieut. B. P. B. Carter, D.F.C. (Dec. 23, 1927) ; Flying Officer A. H. P. Pehrson (Jan. 20) ; Flying Officer W. R. K. Atkinson resigns his commn. (Nov. 16, 1927).

PRINCESS MARY'S R.A.F. NURSING SERVICE

Sister Miss C. E. Holden resigns her appointment (Oct. 1, 1927).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander : V. S. Brown, to Cambridge University Air Squadron for duty as Chief Instructor, 1.2.28.

Squadron-Leaders : V. R. Scriven, A.F.C., to R.A.F. Base, Gosport, 23.1.28. A. G. Jones-Williams, M.C., to No. 23 Sqdn, Kenley, 21.1.28.

Flight-Lieutenants : J. S. Harrison, to R.A.F. Base, Gosport, 11.2.28. W. Elliot, to No. 207 Sqdn., Eastchurch, 23.1.28. H. N. Thornton, to No. 601 County of London (B) Sqdn., Hendon, 1.2.28. C. Porri, to Air Ministry, Dir. of Operations and Intelligence, 2.12.27. A. H. Love, to No. 2 Sqdn., Manston, 4.2.28.

Flying Officer L. H. Ross, to No. 43 Sqdn., Tangmere, 17.2.28.

Pilot Officers : R. F. Part, to No. 12 Sqdn., Andover, 27.1.28. N. A. Pearce, to No. 1 Flying Training Sch., Netheravon, 15.3.28. C. Stephenson, to No. 2 Flying Training Sch., Digby, 30.1.28. A. M. Butt, to No. 100 Sqdn., Bicester, 8.2.28. C. H. Hockly, to No. 13 Sqdn., Andover, 9.2.28.

Stores Branch

Flight-Lieutenant A. M. Saywood, to No. 1 Stores Depot, Kidbrooke, 6.2.28.

Accountant Branch

Flying Officer E. C. Green, to H.Q., Cranwell, 6.2.28.

Medical Branch

Flight-Lieutenant (Dental) R. G. J. Charlesworth, to R.A.F. Depot, Uxbridge, on appointment to a Temp. Commn., 9.1.28 ; to Station H.Q. and Storage Section, Andover, 6.2.28.

Flying Officers : D. A. Wilson, to R.A.F. Station, Bicester, 29.1.28. The undermentioned Flying Officers are posted to the Med. Training Depot, Halton, on appointment to Short Service Commns., with effect from 2.2.28 :—J. Kemp, M.B., B. B. Kennedy, M.B., J. J. MacAndrews, M.B., R. F MacLatchy, M.D., J. B. Murphy, M.B., J. C. Neely, B.A., F. A. O'Connor, M.B., L. O'Connor, M.B., and J. J. Quinlan, M.B.

Flying Officer (Quartermaster, Medical) P. H. Musgrave, to H.Q., Iraq, 27.1.28.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty :—

Lieuts. (Flying Officers, R.A.F.) : R. A. Kilroy, to *Courageous*, temp. (Jan. 25) ; A. C. G. Ermen, to *Eagle*, and for full flying duties in 423 flight (Jan. 9).

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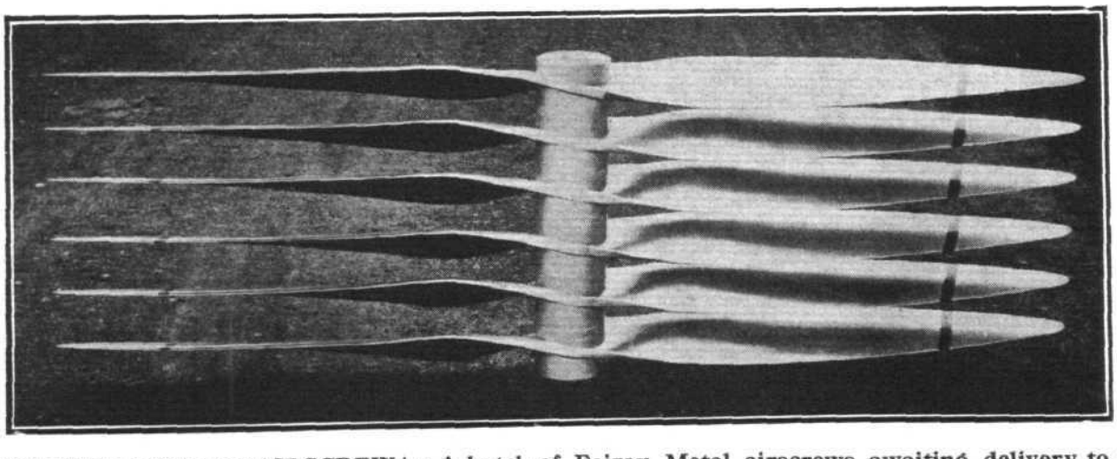
The Royal Air Force in India. Increase of Two Squadrons

IT was announced some time ago that the strength of the Royal Air Force in India was to be increased from six to eight squadrons by sending two bombing squadrons out from Great Britain. The two squadrons which have been selected are No. 11 Bombing Squadron from Netheravon and No. 39 Bombing Squadron from Spittlegate.

At present it appears that this access of strength to India entails the loss of two squadrons to the Wessex Bombing Area, and consequently to Air Defences of Great Britain. But as the policy of the Government is not to deplete A.D.G.B., but to increase its strength according to a regular programme, it has been decided that these two squadrons will be replaced, the replacement not being part of the regular expansion but additional to it.

No. 11 Bombing Squadron (Squadron Leader E. A. B. Rice, M.C.) is equipped with Horsleys (Rolls-Royce 650 h.p. "Condors"), and No. 39 B.S. (Squadron Leader H. V. Champion de Crespigny, M.C., D.F.C.) with D.H.9A's (400 h.p. "Libertys"). The latter, of course, is an obsolescent type due for replacement throughout all commands of the Royal Air Force, but the Horsley is modern standard equipment for day-bombing squadrons. Nevertheless, it is probable that on moving to India both squadrons will be re-equipped with the new "general purpose" machine, the Westland Wapiti with "Jupiter" 450 h.p. engine.



NOT A MULTIPLE TYPE OF AIRSCREW ! : A batch of Fairey Metal airscrews awaiting delivery to Messrs. De Havilland for use on D.H "Moths."

IN PARLIAMENT

Air Ministry

MR. ALBERY, on February 9, asked the Secretary of State for Air the total number of personnel employed at the Air Ministry under the following headings: military, civilian, and the total number of Air Force staff employed of the rank of flight-commander and higher ranks respectively, on January 1, 1928?

Sir S. Hoare: The numbers asked for are as follow:—Service personnel, 149; civilian, 1,671; Air Force officers of rank of flight-lieutenant (there being no rank of flight-commander) and higher ranks, 126

Royal Air Force Recruits

MR. LANSBURY, on February 14, asked the Secretary of State for Air how many men and boys offered themselves for service in the Royal Air Force during the 12 months ended December 31, 1927; the number accepted for service; the number rejected; and the reasons for such rejections?

Sir S. Hoare: The following is the reply:

Men: Number who presented themselves for recruitment, 8,356; number accepted, 2,453; number rejected, 5,903. Boys: Number who sat for education test, 2,171; number who passed, 1,475; number rejected on medical grounds, 192; withdrawals after examination, 253; number attested, 1,030.

The chief causes of rejection were educational unfitness, unsuitable references, dental defects, deformities of feet, poor physique, diseases of ears or heart, respiratory diseases and defective vision.

Empire Airships Mooring Masts

COLONEL WOODCOCK asked what progress has been made by the Dominion Governments for the erection of standard mooring masts for the use of Empire airships?

Sir P. Sassoon: His Majesty's Government in Canada have selected a site for a mooring mast base at St. Hubert, Montreal, and work is now in progress there. The head of the tower is being ordered by the Air Ministry on behalf of the Canadian Government, but the rest of the structure and the equipment are being ordered in Canada. His Majesty's Government in the Union of South Africa have not yet decided which of four possible sites should be selected. They have asked the Air Ministry to order the whole of the equipment necessary, and the masthead has already been ordered. A contract for the tower structure and machinery will be placed when the site has been selected.

R.A.F. Motor Cars

MAJOR G. DAVIES asked whether any motor cars and chassis of foreign design have recently been ordered for the use of his Department; and, if so, whether he will explain why it was found impossible to use British motor cars and chassis for the purpose?

Brigadier-General Charteris asked whether a number of Ford vehicles have recently been purchased by the Royal Air Force, the last date of purchase of vehicles from the Ford company, and whether in future purchases for the Air Force British vehicles will be given preference?

Sir P. Sassoon: There have been no purchases of cars and chassis of foreign design since last June, when a number of Ford vehicles were ordered, but I should like to make it quite clear that this was not a case of the purchase of a foreign product, since practically the whole of the manufacture and assembly was, in fact, British. Improved types of vehicles have been under trial, and have proved satisfactory for the purposes for which Ford vehicles have hitherto been required, and it is anticipated that future orders will be for these improved types, which are of British design as well as manufacture.

* * * *

PERSONALS

To be Married

A MARRIAGE has been arranged between JOHN BERESFORD COLE-HAMILTON, Squadron-Leader, R.A.F., younger son of Mr. and Mrs. John Cole-Hamilton, of The Martyns, Salisbury, and HILDA VIOLET, younger daughter of Mr. and Mrs. C. LESLIE FOX, of Rumwell Hall, Taunton.

THE engagement is announced between FLIGHT-LIEUT. S. L. G. POPE, D.F.C., R.A.F., third son of the late Mr. and Mrs. William Pope, of Waterford, Ireland, and PAMELA, elder daughter of DR. and MRS. A. CAMERON YOUNG, of Ipswich.

THE marriage will take place next month between SQUADRON-LEADER JOHN WHITAKER WOODHOUSE, D.S.O., M.C., son of the Rev. J. T. and Mrs. Woodhouse, of Dorking, and KATHLEEN ELEANOR WILKES, daughter of MR. David Wilkes, of Forest Hill.

A MARRIAGE has been arranged, and will take place shortly, between Sqdr.-Ldr. R. S. BOOTH, A.F.C., R.A.F., younger son of the late Rev. J. W. W. Booth, of Prestwood, Bucks, and Mrs. Booth, of Banbury Road, Oxford, and LILY, only daughter of Mr. E. J. TAYLOR of Fairlight, Luton.

THE engagement is announced between LEE MURRAY, R.A.F., younger son of Dr. Hugh L. Murray, of Melbourne, and NANCY, younger daughter of Mr. and Mrs. Harold CLOUSTON, 33, St. Mary's Road, Wimbledon.

* * * *

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

THE S.M.A.E. Committee is now able to announce the Dates and Rules for the first three Flying Competitions for 1928.

(*a*) Gamage Cup at Wimbledon Common, March 24, from 4 to 6 p.m. Rules:—(1) The competition is an open one. Entrance fee for non-members, one shilling. (2) Any type of model aeroplane may compete. (3) The best duration of three permissible flights to count. (4) Any model which rises from the ground under its own power for any of its three flights will be given an additional ten seconds to the duration of such a flight. (5) Competitors using compressed air models will only be allowed to compete if the containers are charged by pumps operated by physical energy. (6) The winner to hold the Cup for one year and to receive S.M.A.E. Silver Medal. Second award, S.M.A.E. bronze medal. Third award, S.M.A.E. diploma.

(*b*) M.E. No. 1 Cup at Sudbury, Middlesex, April 14, from 4 to 6 p.m. Rules:—(1) The competition to be for two types of model, (*a*) wing only machines having no fuselage or spar, the supporting surfaces being covered *top and bottom and enclosing* the power plant; (*b*) Machines having fuselage and depending for their sustentation upon one or more gyros or autogyros; any fixed horizontal stabilising surfaces being no greater than one half of the total area of the rotating surfaces. (2) The models to be hand launched. (3) Any type of power plant may be used. (4) The best duration of six permissible flights to count. (5) Winner to hold Cup for one year and receive S.M.A.E. silver medal. Second, S.M.A.E. bronze medal. Third, S.M.A.E. diploma.

(*c*) M.E. No. 2 Cup at Sudbury, Middlesex, April 28, 4 to 6 p.m. Rules:—(1) The competition to be an open one. Non-members one shilling entrance fee. (2) Any type of fuselage glider may compete. (3) All gliders to be hand launched. (4) The best duration of six permissible flights to count. (5) Winner to hold Cup for one year and receive S.M.A.E. silver medal. Second, S.M.A.E. bronze medal. Third, S.M.A.E. diploma.

S. H. F. CROUCH (*Hon. Secretary*),
23, Mayfair Avenue,
Ilford, Essex.

IMPORTS AND EXPORTS, 1926-1927

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

For 1910 and 1911 figures see FLIGHT for January 25, 1912.
For 1912 and 1913, see FLIGHT for January 17, 1914.
For 1914, see FLIGHT for January 15, 1915, and so on yearly, the figures for 1927 being given in FLIGHT, January 19, 1928.

	Imports.		Exports.		Re-Exports.	
	1927.	1928.	1927.	1928.	1927.	1928.
	£	£	£	£	£	£
Jan. ..	1,850	1,220	49,021	157,598	—	330

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COMPANY DOINGS

Rolls-Royce, Ltd.

THE twenty-first annual meeting of Rolls-Royce, Ltd., was held at Derby on February 10, Lord Wargrave presiding. He said that the very satisfactory result on the past financial year was in a great measure due to the untiring and successful efforts of Mr. Basil Johnson, the managing director, and the special committee of officials the Board set towards the end of 1926 to reorganise and effect economies. Last year, he said, they were informed that they might shortly expect success to crown the efforts of Mr. Royce in connection with the fresh designs of aero. engines which he had projected. Both of them had proved highly successful in the very severe tests to which they had been subjected. A number of these engines had been delivered to the Royal Air Force for use in experimental machines, and the result obtained up to date had been of a most encouraging order.

NEW COMPANIES REGISTERED

REID AND SIGRIST, LTD.—Capital £4,000, in £1 shares. Acquiring from G. H. Reid any interests in patents relating to flying apparatus, manufacturers of and dealers in aeroplanes, airships, etc. Permanent directors: G. H. Reid (chairman), Squadron Leader (R.A.F.) retd., F. Sigrist, Eva A. Mai Reid. Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, Strand, W.C.2.

BLACKBURNS (LONDON), LTD., 1-3, Stephen Street, Tottenham Court Road, W.1.—Capital £10,000 in £1 shares. General engineers and merchants, manufacturers of and dealers in machinery, tubes, ferrous and non-ferrous metals and pipes of all kinds, motor and aero engineers, etc. First directors: H. V. Blackburn, Mrs. Frances M. Blackburn.

* * * *

PUBLICATION RECEIVED

Aeronautical Research Committee Reports and Memoranda: *No.* 1108.—The Rotating Wing in Aircraft. By H. E. Wimperis. August, 1926. Price 6*d.* net. *No.* 1109.—The High-Duty Compression-Ignition Engine. By D. R. Pye. August, 1926. Price 9*d.* net. H.M. Stationery Office, Kingsway, London, W.C. 2.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motor
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1926
Published February 16, 1928

18,124. F. WENK AND WELTENSEGLER-FLUGZEUGBAU-GES. Aeroplanes. (283,980.)
26,424. WHITEHEAD TORPEDO CO., LTD., and A. E. JONES. Radial cylinder engines. (284,024.)
28,216. L. W. BONNEY. Aeroplanes. (261,050.)
28,626. Sir W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD., and H. N. WYLIE. Metal spars. (284,048.)
32,880. H. R. MCCLINTOCK. Parachute packs. (254,150.)

APPLIED FOR IN 1927
Published February 16, 1928

9,124. O. J. BOOS. Bomb-dropping device for aircraft. (284,107.)
10,036. K. N. PEARSON. Ailerons. (284,110.)
17,443. SCHNEIDER ET CIE. Piece of ordnance for firing upon aircraft. (284,139.)
25,752. ROHRBACH METALL-FLUGZEUGBAU GES. Cabins of aircraft. (279,372.)
27,788. ROHRBACH METALL-FLUGZEUGBAU GES. Cabins of aircraft. (279,459.)

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